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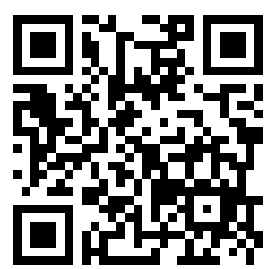

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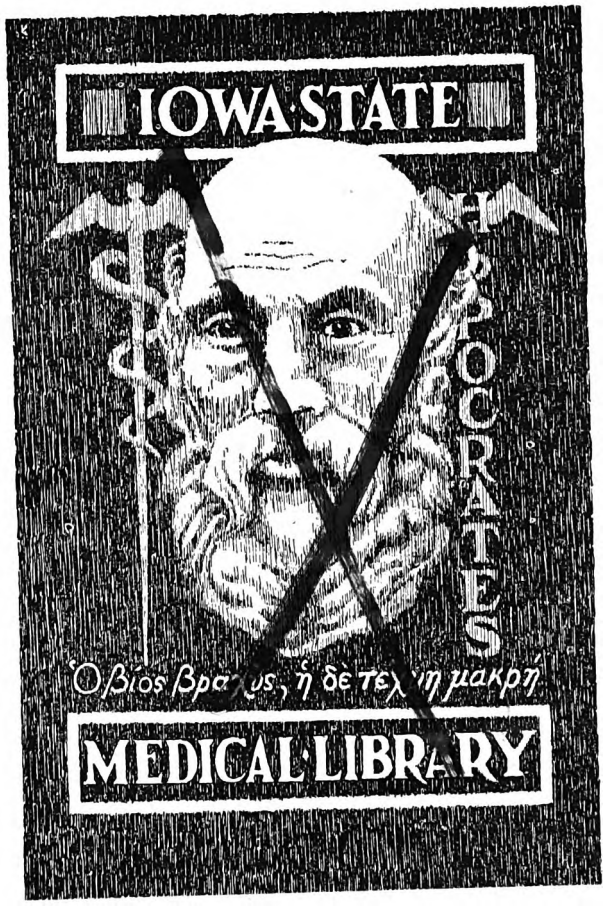

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ACUTE PYOGENIC ARTHRITIS OF THE HIP

AN OPERATION GIVING FREE ACCESS AND EFFECTIVE DRAINAGE

G. R. GIRDLESTONE, B M OXFD, F R C S

SEVERE persistent sepsis in or round the hip has been one of the bugbears of surgery; once the infection has seeped out of the joint, sinuses burrow among the tendons round the neck of the femur and the small trochanter, or having penetrated the acetabulum produce an intrapelvic abscess. The difficulty has been first of all to provide free drainage for these deep-seated lesions, then—still more difficult—to maintain that freedom continuously over the period which is required for internal healing. It is no longer now a matter of drainage of the hip-joint but of a much larger infected area which often represents a miniature rabbit-warren of sinuses and cavities.

In and after the last war I found none of the standard drainage operations satisfactory. The presence of the sciatic nerve so hampers the posterior approach that drainage can only be free for a few days, while it is futile to attempt to establish drainage of the hip by an anterior approach. The older methods do not give the surgeon a good view of the acetabulum; but their gravest fault is that it is impossible to maintain free drainage for more than a very short time. Furthermore, the posterior approach produces a discharging wound in a most awkward position.

In 1921, as a result of profound dissatisfaction with these cases, many of which resulted from gunshot wounds of the war, I worked out a method which has proved effective and reliable ever since. I have described it briefly elsewhere with special reference to secondarily infected tuberculosis[1]; but the method is little known and surgeons who have seen it in use believe that if it were widely known it would prove of great value in the surgery of infected wounds involving the hip.

Acute pyogenic arthritis of the hip is rare in times of peace. An early hæmatogenous infection of the joint, especially if the organism is a streptococcus rather than the *Staphylococcus pyogenes aureus*, will often subside if the joint is immobilised and aspirated every day (under anæsthesia). My colleagues and I have had a number of such cases in which immobilisation on a frame and daily aspiration (for 3 or 4 days) has led to recovery with full movement. If, however, the illness is severe and high fever persists in spite of this treatment radical drainage is quickly indicated. This outcome is to be expected where the infective organism is the *Staph. pyogenes aureus*, and in particular where there is infection associated with devascularisation of bone within the joint: this may be the result of an infective embolus leading to infarction and septic necrosis, or of the shattering effect of a gunshot wound. Whether in war or in peace, the illness is severe, painful and dangerous; its course may prove long, exhausting and bitterly disappointing; its victim greatly needs effective succour.

PRINCIPLES OF THE METHOD

By the technique to be described something approaching saucerisation of the joint is achieved; and the advantage of the method lies not only in the full exposure it can give to the acetabulum after excision of the head, but in the access it affords for the adequate drainage of a still deeper intrapelvic abscess via ilium or acetabular floor.

Indications.—The operation is called for in acute pyogenic infection of the hip—hæmatogenous, from compound fracture, or from gunshot wound—in which the fever has not given way to more conservative measures, such as immobilisation, daily aspiration, and chemotherapy by sulphanilamides or penicillin. Such a condition is dangerous and demands radical drainage. Cases can be divided into two groups. In the first, group A, the hip-joint is not yet ankylosed; the cavity may be distended with pus, or suppuration may be almost absent with symptoms just as severe and threatening as if it was considerable. In others infective materia may already have leaked out to spread further sepsis between the muscular planes. In order to ensure effective drainage the excision of the head and neck, with erasion and saucerisation of the acetabulum, is almost always indicated as the final part of the operation. Occasionally it is better to stop after the wide exsection of capsule and synovia in the hope that it will suffice. I am still diffident of laying down the indications for this less radical procedure, but it is clearly contra-indicated wherever there is evidence of partial or complete necrosis of the head. Group B contains those cases in which ankylosis has already developed, and in which pus has escaped from the joint and burrowed into the intermuscular planes in various directions. Deep-seated sepsis round the hip is very resistant to moderate surgical measures. Abscesses are opened with but temporary relief; there is surface healing; sinuses become established; from time to time these tend to close; the pus is bottled up; there is persistent sepsis, with recurrent flares. It is a miserable prospect.

Radiology.—In the cases seen at a late stage with one or more sinuses it is generally wise to obtain all possible evidence as to the ramifications of the tracks, and the situation of any deep-seated abscesses, by iodised oil injection followed immediately by stereoscopic radiography. These injections are carried out on the X-ray table; and the iodised oil is injected slowly without much pressure. Sometimes the nozzle of the syringe is applied to the opening of the sinus, at other times a small rubber catheter is inserted to carry the oil in as deeply as possible.

Technique.—The new method of drainage differs from the older ones in three ways: the approach is lateral; the incisions are at right angles to the muscle and fascial planes; and a large mass of muscular tissue is exsected. In most cases the approach is external only, with a wide exsection of the abductors and the great trochanter; but an additional mesial approach is sometimes indicated with a similar wide exsection of the adductors. The main nerves and arteries in front and the sciatic nerve behind are in no way disturbed or endangered. The considerable loss of abductors and adductors is of no consequence if the hip is ultimately ankylosed; and of little consequence if pseudarthrosis is established, since active weight-bearing abduction is in any circumstances impracticable, and adduction useless. Thus the great virtue of saucerisation of this deep-seated joint is achieved by the sacrifice of muscles which are no longer valuable.

GROUP A

Position and splintage.—During the operation the patient lies undisturbed on a Robert Jones double hip frame or in a long plaster spica with a big window (fig. 1). Alternatively, if the hip infection is acute and the patient only seen at a stage when operation is urgent, he may come to the theatre unsplinted; he is then put on a frame or in plaster at the conclusion of the operation while still anæsthetised. In such a case the pelvis and the knee of the affected limb are raised from the operation table on sandbags to give free access to the outer aspect of the gluteal region. Occasionally one has to deal with unfortunate patients with bedsores behind the pelvis or spine; here neither frame nor plaster can, for a time, be used; in this event after the complete operation the limb can be suspended in a Hodgen, flexed 20° or 30° at the knee. If a Hodgen is not available a flexed Thomas can be used "Hodgen fashion," but the ring must not be pushed up into its normal position or it will intrude upon the wound.

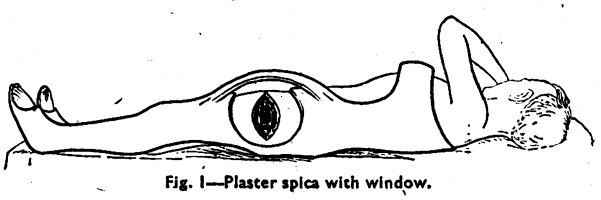

Fig. 1—Plaster spica with window.

Operation.—A long transverse incision is made from about 1 in. behind and below the anterior superior spine backwards with the centre about 1 in. above the great trochanter. The

1. The Robert Jones Birthday Volume, Arthrodesis and other operations for Tuberculosis of the Hip, London, 1928, p. 347; also Tuberculosis of Bone and Joint, London, 1940.

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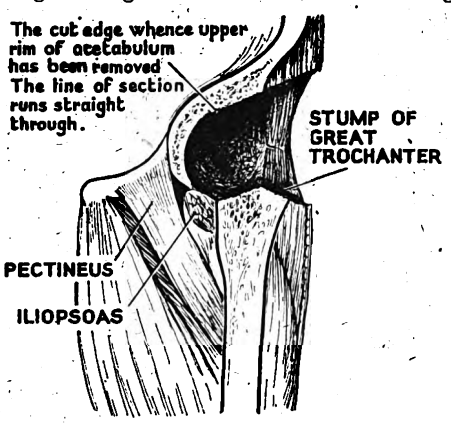
skin edges are retracted up and down to expose a wide elipse of gluteal fascia covering the gluteus medius and the anterior inch or two of the maximus. Two deep transverse incisions are now rapidly made by successive sweeps of the knife between each of which any bleeding vessels are clamped. The upper incision, directed inwards and slightly downwards, divides the glutei down to the ilium just above the acetabulum; the first sweep of the lower incision, which is directed inwards and slightly upwards, exposes the outer side of the base of the great trochanter, which is at once divided by a wide chisel directed obliquely upwards to the digital fossa; the trochanter is retracted up and the division of the soft tissues completed (fig. 2). The knife does not approach the anterior crural (femoral) nerve in front or the sciatic behind. The whole mass of tissues, consisting of glutei and great trochanter, is now removed and hæmostasis carried out by diathermy, by ligature, or by interrupted hæmostatic sutures of finest catgut in small fully curved round-bodied needles. The whole upper and outer aspect of the capsule of the hip lies exposed. The capsule and synovia are removed and the underlying portions of neck, head, and acetabular rim are seen. The neck is then divided near its base by a 1½ in. chisel, and the femoral head removed. The removal of the head is greatly facilitated (as it is also in performing pseudarthrosis for osteoarthritis) by the oblique removal of the upper acetabular rim by a 1½ in. or 2 in. gouge of suitable curvature (this step is in either case beneficial). All the cartilage is gouged or scraped out of the acetabulum and the rotten bone curetted. The discovery of an intrapelvic abscess indicates the removal of the acetabular floor with as much of the neighbouring ilium as will ensure free drainage. It is the rule in this operation to leave no cartilage, no diseased bone, no dead tissue and no dead spaces. The erasion of the acetabulum should leave raw surfaces of vascular cancellous bone. The operation can be done very quickly if the chisels and gouges are large, sharp, and of fine material and thin section. The exsection of the broad wedge of abductors and great trochanter provides really good drainage (fig. 3); the gluteal stumps retract, for the incisions are analogous to the first cuts in a shoulder or leg of mutton.


The cut edge whence upper rim of acetabulum has been removed
The line of section runs straight through.
STUMP OF GREAT TROCHANTER
PECTINEUS
ILIOPSOAS
Fig. 3—The operation cavity seen in section.

After the excision of the deep tissues, I used to draw the upper flap of skin fairly far down into the wound by a continuous catgut suture, and often the lower flap too. The sutured skin-flaps thus cover the freshly cut muscular surfaces. I found this point in technique very valuable in this and similar drainage operations as it reduced the pain of dressings, and covered the more superficial raw areas from which granulations grew excessively. When however there has been infection of the intermuscular planes, the skin flaps should not be sutured deep to the deep fascia; and nowadays the use of vaseline or paraffin wax and the infrequency of dressings have made this step less often worth while.

GROUP B

The hip is ankylosed, with two striking advantages—the obliteration of the joint cavity and the stabilisation of the limb. It is therefore most undesirable to dig out the head. But there may well be sinus tracks ramifying round the neck and the small trochanter. In such cases, after the lateral drainage down to, but not through, the neck, it may be necessary to carry out a similar additional exsection of muscular tissue on the inner side. Portions of the pectineus and of the adductor longus and brevis are then exsected on the inner side as well as of all three glutei on the outer. When this double drainage has been performed, the skin in front remains intact over the tensor fasciæ femoris,

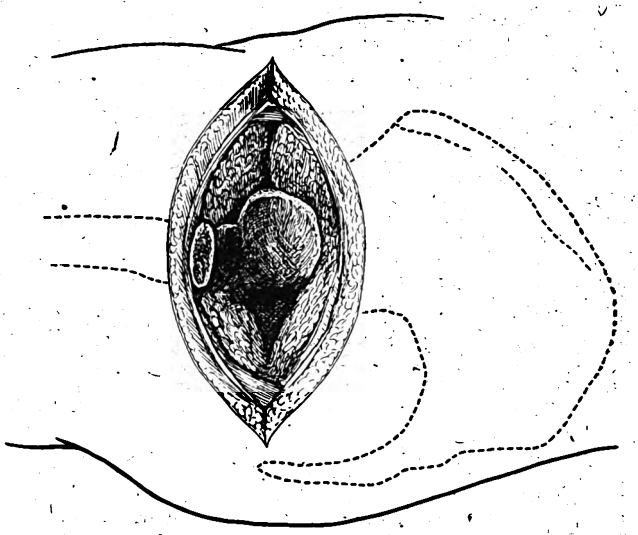


Fig. 2—The operation completed.

sartorius, and rectus, with the lateral cutaneous and anterior crural nerves, and the superficial and deep femoral arteries, veins and lymphatics, and the skin behind covers the posterior part of the gluteus maximus together with the hamstrings, the adductor magnus, and the sciatic nerve. As ankylosis exists, splintage is unnecessary.

Hæmorrhage.—The operation causes some loss of blood but only for a very short time, and one of its great virtues is that the surgeon can see and catch the bleeding points; any oozing from the vascular cancellous bone of the ilium ceases with a temporary gauze pressure followed by the much gentler pack. Some of these patients are exhausted by pain and toxæmia; these have been transfused during the operation. Of late years I have used the continuous drip method in almost all cases; the rapidity of intake of blood can be matched to the loss during the operation, and after the patient's return to his ward a much slower drip is kept up for 6 or 12 hours.

SUBSEQUENT TREATMENT

The success of this operation and the comfort of the patient depend on good splintage, nursing and dressing. The double hip frame is best, but only if the nurses thoroughly understand the care of a patient on a frame; a big plaster spica, with ample window and bridge (fig. 1) comes next, and the suspension and traction of the limb on a Hodgen (or Thomas) is reserved for patients to whom neither of the former methods is applicable.

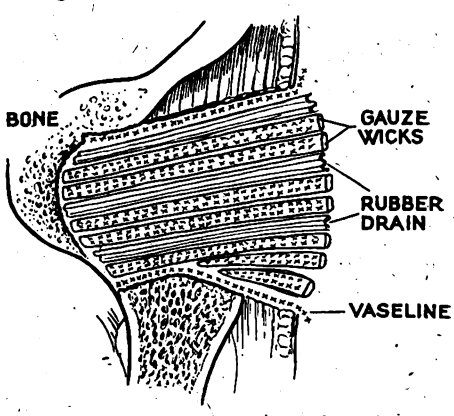


Fig. 4—Rubber drains and gauze wicks in place.

After the removal of the head and most of the neck, upward displacement of the femur in relation to the innominate *must not* be permitted, for such a movement would close the opening, spoil the saucerisation, and bottle-neck the acetabulum. The position is maintained by fixed traction on the frame, by suspensory traction on the Hodgen, or by a well-fitting long plaster spica with the knee in flexion, and a good hold on both ischial tuberosities.

Dressing.—The sides of the entrance should be lined with fine-mesh bandage impregnated with soft paraffin: two or three 1-inch strips of corrugated rubber tissue and

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ample gauze drains reach to the bottom of the cavity (fig. 4). The main gauze pack should be enough to fill the funnel-shaped wound, but each piece of gauze should run straight in from the surface, and never be a long wick packed in by repeated pokes of a probe; for this ancient packing technique leads to the formation of a big cavity which with its narrow neck resembles a chemist's flask.

Result.—If the operation is well done the relief from illness and distress is dramatic. If the subsequent treatment is good most of the cases will heal soundly in a few months. The great gaping wound becomes a narrow scar.

EXPERIMENTAL TRAUMATIC "SHOCK"

FACTORS AFFECTING MORTALITY AND EFFECT OF THERAPEUTIC AGENTS (ASCORBIC ACID AND NUPERCAINE)

G. UNGAR, D SC, M D PARIS *

(*From the Department of Human Anatomy, Oxford*)

As emphasised by Wiggers (1941), one of the more obvious causes of the slow progress in the investigation of shock is the lack of quantitative data. A likely reason for this lack is the common belief that the degree of shock is independent of the extent of trauma, and that it is an all-or-none reaction, depending chiefly on peculiarities of the traumatised organism.

The experiments reported in the first part of this paper were designed to test the thesis that a quantitative relation exists between the amount of trauma and the severity of shock. Such a test required a quantitative method of traumatisation, and the numerical estimation of its results. An immediate difficulty arose in the lack of agreement about the diagnostic criteria of traumatic shock and their measurement. In general, symptoms are attributed to shock when they cannot be directly ascribed to hæmorrhage, injury of a vital organ, or sepsis. Thus when an animal dies after trauma and has not shown symptoms which can be attributed to these other factors, it can be taken, by exclusion, that it has died of shock. Death itself, therefore, may be regarded as a criterion of shock provided it cannot be related to more obvious causes.

Recently Noble and Collip (1942) have described experiments in which a quantitative method was employed for studying traumatic shock. Animals were placed in a rotating drum on the inner walls of which transverse ridges had been fitted. As the drum was rotated the animals inside were knocked against these transverse struts. It was found that there was a definite relation between the mortality-rate and the number of revolutions to which the animals were subjected.

The experiments reported in the present paper were carried out by a different technique, a brief description of which has already been given (Ungar 1942) and which is described in further detail below. The experiments had been carried out before the paper by Noble and Collip appeared. The results obtained by these workers, like those of our experiments, show that traumatic shock can be studied by a quantitative technique which, in constant experimental conditions, yields constant results as expressed by the mortality-rate. The experiments described in the second part of the paper are concerned with the influence of various factors on post-traumatic mortality, studied by means of a standard technique.

TECHNIQUE

All the experiments were carried out with the animals under urethane anæsthesia. Adult guineapigs, rats and mice were used. In investigating the problem of shock the primary requirement of a traumatising technique is the elimination of factors such as hæmorrhage, injury of a vital organ, or sepsis, which can cause death directly. This can be done by traumatising skeletal muscle in a region where bleeding is minimal, and by limiting the time of observation to an interval during which it is improbable that bacterial sepsis could play a part. In the present experiments the traumatised area was the adductor region of the thigh. Measured traumas were administered by means of the following technique.

A metal rod was dropped through a vertical metal tube on to the thigh of the animal, which rested on a heavy anvil. For convenience, the amount of trauma can be expressed in terms of "energy input," which is given in kilogrammemetres (kg.m.) by the weight of the rod and the height from which it fell. When several hits were administered in order to cause more severe trauma, the total energy input was taken as the sum of energies transmitted by each individual hit. It should be emphasised that the expression of the amount of trauma in terms of the energy of the falling weight by which it is caused represents only a convenient method of indicating the relative magnitude of the trauma produced.

A metal rod of 12 mm. diameter was used for guineapigs and rats, and one of 6 mm. diameter for mice. In all cases the rod caused an open wound with destruction of muscle and, in a small number of cases, fracture of the femur. A few cases were eliminated from the results because of hæmorrhage. The traumatised animals were maintained at a temperature of 19–23° C. They were kept under observation (under anæsthesia) for 10 hours; those which survived this interval were killed 24 hours after the trauma.

In a few experiments a different technique was used. Small steel projectiles ($\frac{3}{32}$ in. in diameter and weighing 53 mg.) were shot right through the adductor region of guineapigs. The impact and residual velocities of the projectiles were recorded by Boy's spark-photography method. As the mass of the missile was constant, the velocity records gave a measure of the amount of energy transmitted to the tissues.

RELATION BETWEEN AMOUNT OF TRAUMA AND MORTALITY-RATE

Series of 47 guineapigs, 81 mice and 20 rats were traumatised by the falling weight at different energy input levels. Table I gives the mortality in the different groups. The guineapig experiments referred to in this table were carried out between December, 1941, and February, 1942. Those on rats were performed in April, 1942, and those on mice between May and July, 1942.

TABLE I

Animals	Energy (kg.m.)	No. of animals	Died	Mortality-rate %
Guineapigs	0·5 –1·5	5	0	0
	1·55–2·0	9	0	0
	2·05–2·5	8	1	12·5
	2·55–3·0	8	2	25·0
	3·05–3·5	8	6	75·0
	3·55–4·0	9	9	100·0
Mice	0·25	10	1	10·0
	0·5	13	3	23·0
	0·65	10	5	50·0
	0·8	10	8	80·0
	1·0	28	24	85·5
	1·9	10	10	100·0
Rats	1·9	10	3	30·0
	3·8	10	5	50·0

Table I shows that the mortality-rate increases with the energy input value of the trauma. Thus no guineapig died at energy levels less than 2 kg.m., whereas all died at and above 3·55 kg.m. The results for the guineapigs and mice have been analysed by the probit method (Bliss 1938, Fisher and Yates 1938). The energy levels at which 50% of traumatised animals die are as follows:

guineapigs, 2·94 kg.m. ± 0·07 (standard error)
mice, 0·6 kg.m. ± 0·05 (standard error)

In the shooting experiments, performed on 25 guineapigs, the percentage mortality-rate was also found to be related to the energy of the missile.

No attempt was made to study the influence of such factors as sex, age or breed. Each group of animals contained approximately equal numbers of males and females. Experimental conditions were kept as constant as possible, and no treatment, either local or general, was given.

The experiments described in the following sections were designed to study seasonal changes in post-traumatic mortality and the influence of previous trauma, ascorbic acid and local anæsthetics on the mortality-rate. In all the guineapig experiments the energy value of the trauma was fixed at 3·8 kg.m., the level of 100% mortality in the first set of experiments. The general conditions

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of anæsthesia, temperature, &c., in this second set of experiments were the same as in the first.

SEASONAL VARIATIONS IN POST-TRAUMATIC MORTALITY

As already noted, the experiments on guineapigs described above were performed in winter. Further observations showed that post-traumatic mortality undergoes seasonal variations. These variations were studied during 8 months (June to January) in guineapigs traumatised at an energy input level of 3·8 kg.m. The results are shown in table II.

TABLE II

Month	No. of animals	Died	Mortality-rate %
June	8	5	62·5
July	11	6	55·5
August	9	4	44·0
September ..	16	10	62·5
October	8	6	75·0
November ..	8	6	75·0
December ..	8	8	100·0
January	9	9	100·0

The variation from month to month exhibits a regular trend. The figures have been tested by the χ^2 method. After grouping the months in pairs a definitely significant result is obtained. This variation may be due to seasonal changes affecting the animal. It is not due to any differences in the conditions of the experiments, since both in winter and summer the temperature of the room in which the experiments were carried out was maintained at the same level.

EFFECT OF PREVIOUS TRAUMA

A study of the effect of previous trauma on the mortality rate of animals subjected to a subsequent more severe trauma was suggested by some observations made during the course of experiments designed to show the influence of denervation on post-traumatic mortality. As a result of these preliminary observations, a series of experiments was carried out in which guineapigs were given an initial small trauma (under ether anæsthesia) on a forelimb, at energy input levels varying from 0·3 to 0·6 kg.m. At varying intervals after this first trauma the hind limbs of the animals were traumatised, in the standard way, at an energy input level of 3·8 kg.m. Two series of experiments were carried out, the first in June and the second in December. Table III shows that the mortality-rate after a second severe trauma is reduced over a period of at least 3 days if this trauma is preceded by a preliminary slight trauma.

TABLE III

Month	Interval between traumas	No. of animals	Died	Mortality-rate %
June ..	0 (control)	8	5	62·5
	½ to 1 hr.	8	3	37·5
	1 day	8	1	12·5
	3 days	8	2	25·0
	7 ,,	8	5	62·5
	14 ,,	8	5	62·5
December	0 (control)	8	8	100·0
	3 hr.	8	3	37·5
	1 day	8	4	50·0
	2 days	8	1	12·5
	3 ,,	8	1	12·5

The χ^2 test (one degree of freedom with Yates's continuity correction) shows that the control of the winter series differs significantly from all other groups except that with the 1-day interval. The results of the summer experiments are not significant in themselves but show good agreement with those of the winter experiments.

An attempt was made to discover whether the "protective" effect of a previous trauma could be transmitted from one animal to another. Accordingly, guineapigs were bled 2 or 3 days after slight trauma (0·3 kg.m. under ether anæsthesia) and their serum was then injected into a number of other guineapigs, which had been traumatised by the standard technique 15 minutes before the injection. These experiments were carried out in October and November. The results are shown in table IV. It will be seen that 6 of the 8 guineapigs which were injected with serum from non-traumatised guineapigs died as a result of the trauma, whereas only 1 death occurred among 26 guineapigs which had been subjected to the same degree of trauma, but had received serum from other guineapigs traumatised 2 or 3 days earlier. A χ^2 test shows that these results are statistically significant.

TABLE IV

Serum from:	Dose c.cm./kg.	No. of animals	Died	Mortality-rate %
Non-traumatised guineapigs	5	8	6	75
Traumatised guineapigs	5	14	1	7
	1	8	0	0
	0·1	4	0	0

An attempt was next made to discover whether the serum of one species has any "protective" value when administered to another species. Accordingly in another series of experiments the serum of traumatised rabbits was injected into guineapigs, under the same conditions as noted above. Table V shows that 5 out of 8 guineapigs died when given serum from non-traumatised rabbits, whereas only 1 out of 20 died when given serum from traumatised rabbits. A χ^2 test has shown that this difference is statistically significant. It follows, therefore, that the protective action of previous traumas can be transmitted from one species to another.

TABLE V

Serum from:	Dose c.cm./kg.	No. of animals	Died	Mortality-rate %
Non-traumatised rabbits	5	8	5	62·5
Traumatised rabbits	5	8	1	12·5
	1	4	0	0
	0·1	4	0	0
	0·01	4	0	0

EFFECT OF ASCORBIC ACID ON POST-TRAUMATIC MORTALITY

Previous observation has shown that ascorbic acid has a preventive action on anaphylactic shock (Hochwald 1935, Giroud 1936, Ungar et al. 1937) and that it increases resistance to hæmorrhage (Stewart et al. 1941). A series of experiments was therefore carried out on guineapigs, rats and mice in order to discover whether this substance has any effect on post-traumatic mortality.[1] The guineapigs and rats were traumatised at an energy input level of 3·8 kg.m. and the mice at a level of 1·9 kg.m. The results are shown in table VI. A χ^2 test shows that the results obtained for guineapigs are significant.

TABLE VI

Animals	Interval trauma : treatment	No. of animals	Died	Mortality-rate %
Guineapigs	Control	17	17	100·0
	15 min.	22	1	4·5
	30 min.	10	3	30·0
	60 min.	9	5	55·5
Rats ..	Control	10	5	50·0
	15 min.	10	1	10·0
Mice ..	Control	10	10	100·0
	15 min.	10	5	50·0

Table VI shows that, when ascorbic acid is given to guineapigs within 15 minutes after trauma, the incidence of post-traumatic mortality is extremely small. The effect of the drug decreases progressively as the interval between the trauma and its administration is increased and if, for example, it is administered 1 hour after

1. A preliminary report on these experiments has already been given (Ungar 1942).

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trauma only half of the animals will survive. The doses given varied from 100 to 500 mg. per kg. body-weight; 100 mg. seemed to be the minimum effective dose.

It seems improbable that ascorbic acid acts in these conditions as a vitamin, since it is well known that rats and mice synthesise the substance which cannot therefore be regarded as a vitamin when administered to these animals. This suggestion is supported by the observation that a solution of oxidised ascorbic acid, which had been exposed to the air for 6 months and had taken on a dark brown colour (thus presumably losing its vitamin properties), still retained its full effect on post-traumatic mortality. Thus, when 8 traumatised guineapigs were given this substance all survived.

EFFECT OF LOCAL ANÆSTHETICS

According to Soviet writers (Synovich 1940, Pschenichnikov 1940, Novikov 1941, reviewed by Clarke 1941), the systematic use of local anæsthesia in war surgery has resulted in a notable decrease of traumatic and surgical shock. This result was obtained with a Soviet preparation of 'Nupercaine,' called sovkain.

The following experiments show that local anæsthetics also have a considerable effect in reducing the mortality of guineapigs traumatised by the standard technique described in this paper. Nupercaine and procaine hydrochloride were used, the first in doses of 4 mg. per kg. and the second in doses of 100 mg. per kg. The injections were made either in the traumatised area or subcutaneously at a point distant from the trauma—e.g., the shoulder. The interval between trauma and treatment varied from 15 minutes to 2 hours. These experiments were carried out in October. The results are shown in table VII.

TABLE VII

Drug	Point of injection	Interval trauma: treatment	No. of animals	Died	Mortality-rate %
None (control)	..	..	16	12	75·0
Nupercaine ..	Local	15 min.	8	2	25·0
	Distant	15 min.	16	1	6·0
	,,	1 hr.	8	1	12·5
	,,	2 hr.	8	1	12·5
Procaine ..	Local	30 min.	8	6	75·0
	Distant	15 min.	8	5	62·5

Procaine was injected in a 1% solution in saline. For the local injections of nupercaine a 1/5000 solution in saline was used and for the distant injections a 1% solution in distilled water.

It seems clear from these experiments that nupercaine has a definitely beneficial action on post-traumatic mortality, while procaine has no effect at all. Thus, out of the 40 guineapigs treated with nupercaine only 5 died. A χ^2 test shows that all the results are statistically significant. On the other hand 11 of the 16 guineapigs which were given procaine failed to survive—a death-rate almost the same as that observed in control animals.

As the same results were obtained with both local and distant injections of nupercaine, it can safely be assumed that the action of the drug on post-traumatic mortality is independent of its anæsthetic properties. It is to be noted that delay in treatment up to 2 hours after trauma does not decrease the effect.

PATHOLOGICAL CHANGES

All the animals used in the experiments were autopsied and their organs examined macroscopically. The most clearly defined changes were found in guineapigs and consisted of hæmorrhagic and œdematous lesions of thoracic and abdominal viscera. As a general rule in the case of the untreated animals, the lesions were more serious in those which survived than in those which died, and among the latter in those which survived longest.

No changes were seen in a few animals injured at a low energy input level. General visceral hyperæmia, without hæmorrhage, was observed in cases of slight trauma or in cases where the animals died within the first 2 hours after trauma. Hæmorrhagic or œdematous lesions were found in all other cases where no treatment was given. The organs most often affected were the stomach and lungs: hæmorrhagic lesions of the stomach were observed in more than 75% of cases. In a few cases the lesions resulted in rupture of the organ. Lesions were often found in the cæcum, the ileum and the kidney (sometimes associated with hæmaturia). Endocardial hæmorrhage, described by Sheehan (1939) in human shock, was fairly common in guineapigs; it was to be seen in the left ventricle near or on the cusps of the mitral valve. In a few cases lesions were seen in the adrenals and spleen. All these changes are similar to those described by Moon (1938) and more recently by Dunphy and his colleagues (1941).

The pathological changes observed in guineapigs traumatised during the summer months were considerably less: hæmorrhagic lesions were either entirely absent or consisted of only a few small petechiæ. The pathological picture was also altered by the various treatments described in the previous sections. In guineapigs submitted to repeated traumas or injected with the serum of traumatised guineapigs there were definitely fewer lesions, and the difference was even more striking in animals treated with ascorbic acid or with nupercaine. In these groups surviving animals were usually free from hæmorrhagic lesions and those which died had less definite lesions than control animals.

In mice and rats the lesions were less pronounced and less common. Their distribution was different: lung and liver lesions were the most common, and changes in the stomach were not observed.

DISCUSSION

The relation of the post-traumatic mortality studied in these experiments to human traumatic or surgical shock cannot yet be determined. No experimental shock in animals can be completely identified with clinical shock as we do not know in what the latter consists. However, precautions were taken in these experiments to realise conditions as similar as possible to those responsible for human shock. But at the same time it seemed necessary to aim at the elimination of certain factors which nearly always complicate human shock. Thus, the elimination of hæmorrhage was considered important, in order to avoid the usual confusion of the effects of blood loss with shock—a confusion which has been repeatedly criticised by Moon (1938, 1941). Hæmorrhage probably creates two different conditions: acute anæmia, remedied by reinfusion of whole blood; and hæmorrhagic shock, which is irreversible. While the first has nothing to do with shock the second is not easily differentiated clinically. From the experimental point of view it is important to avoid the confusion and to produce either traumatic or hæmorrhagic shock.

Some experiments carried out a few years ago suggested that general anæsthesia significantly increases the chances of death after trauma. The fact that the present experiments were performed under anæsthesia has, therefore, to be kept in mind in any interpretation of the results. Since, however, all were carried out under the same conditions, the influence of the anæsthesia may be regarded as a constant factor which will not affect the comparison of one set of experiments with another.

The results of these experiments lead to the conclusion that the amount of trauma is an important factor in post-traumatic mortality. This conclusion contradicts the general belief that the intensity of shock is independent of the extent of injury. The latter view has no experimental foundation and is based solely on clinical impressions: for example, Crile wrote "operations which were sufficient to produce shock in one animal might in another have little or no effect of this kind" (quoted by Wiggers 1942). The present paper shows that, in spite of the variability in the effect of the same trauma on a series of individuals, there is a regularity, and that the rate of post-traumatic mortality, under standard experimental conditions, is predictable.

No reference is made here to the immediate cause of the post-traumatic mortality studied in the foregoing experiments. The results neither support nor disprove any of the existing theories of shock. Again, no attempt has been made to give an explanation of the mechanism by which the various "protective" actions studied above exert their influence. The effect of previous traumas may be related to the phenomenon called "tachyphy-

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laxis" (Champy and Gley 1911) or "skeptophylaxis" (Ancel et al. 1911), or to the condition described by Selye (1937) under the name of "adaptation"; but the fact that the effect is transmissible brings it nearer to genuine immunity. Whatever may be its nature, the protective action of previous traumas has a definite significance from the point of view of the technique of experimental shock. It may explain certain contradictions in the results of experiments where animals were subjected to various injuries before the shock stimulus.

As to the mode of action of ascorbic acid and nupercaine, only negative conclusions were reached, indicating that ascorbic acid does not act as a vitamin and that nupercaine does not protect against shock by local anæsthesia.

Particular emphasis must be laid on the possibility of utilising these protective actions in the treatment of human traumatic and surgical shock. Nupercaine has already proved successful in the hands of Soviet surgeons. After a preliminary publication of our experiments (Ungar 1942), ascorbic acid was tried in America with satisfactory results according to Holmes (1942). The serum of traumatised animals can also be tried in human cases as soon as a reliable method of titration of activity can be worked out.

SUMMARY

Experiments on guineapigs, rats and mice show that there is a quantitative relation between the amount of trauma, as measured by the energy transmitted to the tissues, and the mortality-rate or probability of death.

It is possible to use a standard traumatising technique which, under constant experimental conditions, yields a constant mortality-rate. The mortality-rate however varies according to the season.

When two traumas were administered in succession the mortality-rate after the second trauma was significantly reduced. The protective action of the first trauma can be transferred by the injection of serum from traumatised animals into other animals of the same or different species.

Ascorbic acid given by injection reduces post-traumatic mortality. Its effect decreases when treatment is delayed after trauma.

Nupercaine protects guineapigs against post-traumatic mortality, not only when it is injected into the traumatised area but also when it is injected at any other point of the body.

The relation of post-traumatic death to human shock is discussed, and it is emphasised that the protective actions described above might be used in the treatment of human cases.

The experiments described above are part of a programme of work on wound ballistics carried out under the direction of Dr. S. Zuckerman. I should like to thank Prof. W. E. Le Gros Clark for his kindness in providing the facilities for carrying out the research, Prof. H. W. Florey for his helpful criticism and Dr. F. Yates for his help in the statistical treatment of the material; also Colonel P. Libessart, who devised the traumatising apparatus, and Mme A. Ungar, who collaborated in the experimental work.

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RATE OF BLOOD-REGENERATION AFTER HÆMORRHAGE

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THE object of this paper is to record observations on the rate of hæmoglobin regeneration after hæmorrhage (venesection). The published work on this subject is scanty and has been reviewed by Fowler and Barer (1942) and elsewhere (*Brit. med. J.* 1942, ii, 342). Fowler and Barer studied 200 blood donors after the withdrawal of an average of 555 c.cm. of blood. They found that the average time to replace the blood loss was 49·6 days, and in a quarter of their cases hæmoglobin regeneration was delayed more than 2 months. They also showed that the administration of 1 g. of iron and ammonium citrate per day increased the daily hæmoglobin regeneration by 49%.

PRESENT INVESTIGATION

Venesections were carried out on 48 male subjects in Stobhill Hospital and Barnhill Institution, Glasgow. Their ages ranged from 27 to 92 years. The distribution of cases according to age-groups is shown in the figure; most of the patients were in the later decades of life, the average age being 60·3 years. The complaints for which they had been admitted to hospital were of no significance in relation to blood regeneration. The 10 cases of hemiplegia were long established in convalescence. In none of the other cases was there any history of hæmorrhage. Care was taken to exclude patients suffering from infection; the Wassermann reaction was negative in all the cases. The patients received the ordinary ward diet, and it was estimated that the average iron content of the food was about 12·6 mg. daily.

Methods.—The volume of blood withdrawn varied from 350 to 1300 c.cm., the average being 710 c.cm. Usually only one venesection was performed, but it was occasionally found necessary to take off smaller volumes of blood two or three times in the course of a few days. The only ill effects seen were signs of collapse in 3 young men suffering from anxiety neuroses and one old man with chronic nervous disease; they all rallied quickly when the venesection was discontinued and 3 c.cm. of nikethamide injected intravenously.

The rate of blood regeneration was determined by periodic estimation of the hæmoglobin; the tests were done four or five times during the first week and then at longer intervals, the average interval being about 7 days towards the end of each series of observations. The Sahli method was adopted, and the Altmann 'Nonfade' hæmoglobinometer was used. A preliminary investigation was carried out to assess the reliability of this method, and the results have been published elsewhere (Alstead 1940). It was established that for accurate serial readings it is essential that the same instruments (colorimeter, graduated tube and pipette) should be used throughout, that the estimations should be made by the same observer, and that his methods in obtaining blood and making the solution of acid hæmatin should be rigorously standardised. The readings were taken at approximately the same time of day; the importance of this precaution has been emphasised by Dreyer, Bazett and Pierce (1920). Under these conditions an experienced worker can obtain readings which are consistent to ± 2%. The results recorded in the present series were averages of two estimations made within a 5-minute period. My colour matching is such that I tend to underestimate the absolute value of the hæmoglobin concentration compared with the average results of six other observers. This point has been more fully discussed in a previous paper (Alstead 1940). This does not affect the gradient of a graph representing rate of recovery; and it is the justification for including in the series patients whose initial hæmoglobin was only 70% Sahli by my own estimation, as this is equivalent to about 95% Haldane (13·02 g. Hb) per 100 c.cm. when estimated by the average observer.

RESULTS

At the outset it was expected that the new Hb concentration would be attained between 24 and 72 hours after

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the venesections. This proved to be correct in less than half the cases. On an average 9·7 days elapsed before the lowest level of Hb was reached. If, however, 4 cases are omitted in which the apparent failure to regenerate was extraordinarily prolonged, the average was 7 days.

Days for Hb to fall to minimum	1–3	4–7	8–15	16–30	Over 30
No. of cases ..	15	18	7	5	3

This phenomenon, though less pronounced, is seen in the graphs published by Schiødt [3] (1936, 1937, 1938) in his observations on patients suffering from bleeding peptic ulcer. He states that "in some patients the rise begins at once (direct rise), while in others there is a pause or even a fall before the curve rises (indirect rise)."

The fall in Hb concentration after venesection was often disproportionate to the volume of blood withdrawn. Thus in case 1 removal of 1300 c.cm. depressed

RELATION OF VOLUME OF BLOOD LOST AND INITIAL HÆMOGLOBIN FALL TO RATE OF REGENERATION

Weeks after venesection	Return to initial Hb	No. of cases	Av. volume blood lost (c.cm.)	Av fall in Hb (%)
10	Yes	36	710	16
10	No	12	720	24
15	Yes	43	740	16·6
15	No	5	590	30

the Hb by only 17 points Sahli; while in case 28 a small venesection (350 c.cm.) caused a fall of 32 points. Again, the duration of the anæmia following venesection showed no constant relationship to the volume of blood withdrawn. The prolonged anæmia which was observed in cases 33, 34 and 35 after small or moderate hæmorrhages may be contrasted with cases 1, 17, 36 and 39 in which much larger venesections were followed by rapid recovery.

It will be seen from the figure that 5 weeks after venesection half the patients showed more or less Hb deficiency. At 10 weeks recovery was still incomplete in a quarter of the series, and even at 15 weeks one in ten were apparently anæmic. Additional data relating to patients with anæmia and those who had recovered at 10 weeks and 15 weeks are set out in the table given above.

From this analysis it appears that the volume of blood lost did not determine the persistence of anæmia after 10 weeks or after 15 weeks. On the other hand, there is some evidence that the duration of the anæmia was proportional to the depression of the Hb after venesection. The number of cases in the present series is hardly sufficient to justify a definite statement on this point, but it is noteworthy that Fowler and Barer came to this conclusion, though Schiødt considered that the time taken for patients to recover after hæmorrhage was independent of the extent of the initial fall in Hb.

The influence of age on the rate of recovery was examined by arbitrarily dividing the patients into a young group and an old group, and by fixing arbitrarily a time-limit for quick recovery. For the purpose of this investigation men under the age of 61 years were regarded as "young," and the time-limit for quick recovery was fixed at 8 weeks. The following table shows the results obtained.

It was therefore concluded that in this series age did not influence the rate of recovery. In 7 patients, after anæmia had persisted for an abnormally long time, the effect of giving iron was tried (ferrous sulphate, gr. 5 thrice daily). The rate of recovery was apparently accelerated in 3 of the patients but in the other four there was no change.

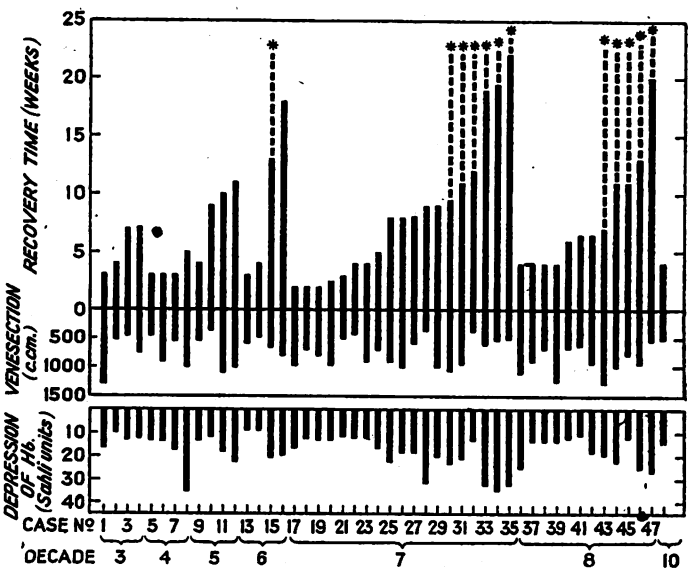
DISCUSSION

The severity of the anæmia following hæmorrhage must be proportional to the amount of blood lost. Nevertheless, numerous factors, constantly in operation and tending to produce hæmodilution or hæmoconcentration, make it difficult to assess the effect of hæmorrhage per se as a determinant of the new hæmoglobin concentration. Thus, the cardiovascular system is not a reservoir with rigid walls; and the capacity of the arteriovenous space containing the circulating blood is subject to considerable fluctuation. Hæmorrhage is followed by a transfer of fluid from the tissue spaces to the circulation. The rate at which this transfer is affected, thus bringing about dilution of the blood, partly determines the rate of onset of anæmia after hæmorrhage. The rate of fall of Hb after hæmorrhage is therefore liable to be affected by the volume of the

—	Old	Young	Totals
Slow	12	5	17
Quick	20	11	31
Totals ..	32	16	48

fluid reserves in the tissue spaces and the amount of water and salt in the diet. Even while dilution of the blood is proceeding and the Hb is falling, there is a tendency for this process to be masked by the outpouring of new red cells from the marrow; and the daily output is generally increased in such circumstances. Again, the effect of hæmorrhage on the Hb concentration may be offset to some extent by the simultaneous discharge of large numbers of red cells from the spleen. After the loss of a large quantity of blood, say 1200 c.cm., considerable demands must be made on the body's reserves of iron and other substances necessary for hæmopoiesis. It follows that the patient who has ample reserves of these materials is likely to recover more rapidly than one who is deficient in them when hæmorrhage occurs.

From these considerations it is obvious that it must often be impossible to calculate by simple arithmetical methods the change in concentration of the Hb following the loss of a known quantity of blood. This contention is supported by the data collected in the present observations. It is suggested that the discrepancies between the volume of blood lost and the observed fall in Hb were due to the transfer of excessive quantities of fluid from the tissue spaces to the blood-stream. L. S. P. Davidson (personal communication) has pointed out that after



Recovery-time, amount of venesection and initial depression of hæmoglobin in 48 cases. In the 12 cases marked with an asterisk the hæmoglobin became stabilised but did not return to its pre-venesection figure. Diagnoses were as follows:

1–3	Neurosis	16	Hypertension	32	Hemiplegia
4	Multiple sclerosis	17	Nil	33	Hypertension
5–7	Neurosis	18	Hemiplegia	34	Hemiplegia
8	Multiple sclerosis	19–21	Hypertension	35	Fractured femur
9	Old gunshot wound	22–23	Senility	36	Senility
10	Hemiplegia	24	Hypertension	37	Hypertension
11	Hypertension	25	Fibrositis	38	Hemiplegia
12	Hemiplegia	26	Hypertension	39–44	Senility
13	Nil	27	Senility	45	Obesity
14	Carditis	28–29	Hemiplegia	46–47	Hemiplegia
15	Paraplegia	30–31	Hypertension	48	Hypertension

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blood-transfusion the change in the recipient's Hb concentration is frequently disproportionate to the volume of the blood given, the observed rise sometimes being greater and sometimes smaller than that expected from the amount of blood transfused. These unexpected results may be accounted for by variation from one individual to another in the manner of making adjustments to relatively sudden changes in the volume of the circulatory blood. Similarly, it is possible that the persistence in some cases of low Hb values long after recovery was expected was due to slowness to rectify excessive blood-dilution rather than to inadequate hæmopoiesis. These tentative views indicate the need for further research supplemented by observations on changes in blood volume.

SUMMARY

Venesections were performed on 48 male subjects whose average age was 60·3 years, and observations were made on the recovery-rate as judged by frequent Hb estimations.

After 5 weeks half the patients were still anæmic, and even after 15 weeks recovery was incomplete in 10% of the cases.

The volume of blood lost did not appear to determine the persistence of the anæmia, but there was some evidence that the duration of the anæmia was proportional to the initial fall in hæmoglobin.

It is suggested that the probable cause of the persistence of a low Hb in some of the patients was over-dilution of the blood by transference of excessive quantities of fluid from the tissue spaces.

I am indebted to Prof. Noah Morris for his interest in this work; and to Sister J. E. Rennie of Stobhill Hospital and Sister H. M. Fisher of Barnhill Institution for their coöperation.

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A RAPID TEST FOR THE SERODIAGNOSIS OF SYPHILIS

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Ide,[1] Kline,[2] Laughlen[3] and Meinicke have described rapid tests on slides for the serodiagnosis of syphilis but these have several drawbacks. For example, not every positive serum can be detected; slide tests are not suitable for a large series of sera, because of evaporation from the small amount of fluid on the slides; the methods are unsuitable for the examination of cerebrospinal fluid; and recent inactivation of serum is advised and time is therefore lost.

While carrying out examinations of cerebrospinal fluid with scarlet red or Sudan III coloured mastic we found the results satisfactory and constant, and we therefore substituted mastic for benzoin or tolubalsam, for the rapid serological test, by adding the mastic to the Kahn antigen. Sera were inactivated chemically (as in the Meinicke by high salt concentration) and it was therefore important to attain a pH of about 6·2–6·5 (slightly acid to neutral red), since a fluctuation in acidity may either produce a non-specific flocculation of the mastic in negative sera or prevent flocculation in positive ones. The necessary pH can be attained by means of a phosphate buffer solution and the optimum concentration of salts, mastic, antigen and the pH were worked out experimentally.

PREPARATION OF ANTIGEN

Reagent 1 (intensifying reagent), made up of (*a*) Fresh beef heart muscle is chopped up, dried in the incubator or by an electric fan and thoroughly ground to a powder. To 25 g. of dried and powdered muscle in a 250 c.cm. Erlenmeyer add 100 c.cm. pure anæsthetic ether. Shake for ten minutes and pour off the supernatant ether. Do not discard the ether decanted throughout the whole process of extraction. Repeat extraction three times with 75 c.cm. ether. Dry the powder till free from odour, weigh and return to flask. Add 4 c.cm. absolute alcohol (dehydrated) per 1 g. of powder. Shake for ten minutes, allow to stand at room temperature for three days; shake again for ten minutes and filter. To each c.cm. of alcoholic extract add 6 mg. cholesterol.

(*b*) The ether collected during extraction is evaporated to dryness at room temperature. To 1 g. of residual substance add 10 c.cm. alcohol. Shake for ten minutes, allow to stand twenty-four hours in the ice-box and filter in the ice-box.

(*c*) Dissolve 10 g. of mastic in 80 c.cm. of absolute alcohol, in a 100 c.cm. measuring flask, by heating in a water-bath. After standing two days in the ice-box add alcohol to make the volume up to 100 c.cm. and filter. Saturate (*a*) and (*c*) with a red fat-soluble dye (scarlet red) and filter or centrifuge. To 10 c.cm. of (*a*) add 1 c.cm. of (*c*) and 0·2 c.cm. of (*b*) to make reagent 1. Reagent 1 is stable for about two months; (*a*) (*b*) and (*c*) are separately stable for a very long time. (*a*), and (*b*) are kept at room temperature, (*c*) in the ice-box.

Reagent 2.	NaCl	9 g.
	KH_2PO_4	0·63 g.
	$Na_2HPO_4 \cdot 2H_2O$	0·35 g.
	Aq. dest.	ad 100 c.cm.
Reagent 3 (diluting fluid).		
	Na_2HPO_4	5 g.
	Aq. dest.	ad 100 c.cm.

Activation of antigen preparatory to use.—To 0·55 c.cm. of reagent 1 add 2·5 c.cm. of reagent 2, the necessary amount of both reagents being previously warmed for 5 min. in a water-bath at about 30° C. Allow to stand for 5 min. in the water-bath and add 1·6 c.cm. of distilled water. After 10 min. the antigen is ready for use and is stable for several weeks if kept on ice.

TECHNIQUE OF TEST

A. *For serum.*—Place one drop (0·05 c.cm.) of serum in a small test-tube (the serum need not be inactivated). Add one drop of antigen. Shake for half a minute and add one drop of diluting fluid. Shake gently for several seconds and examine. In positive cases a strong heavy red precipitate appears; in negative cases the solution remains unchanged. In order to save time when examining many sera it is advisable to read the result after centrifugation for about 2 minutes. In positive cases the precipitation is emphasised.

B. *For CSF.*—In two small test-tubes place 4 and 6 drops of CSF, add one drop of antigen to each, shake for 1 minute and centrifuge at high speed till the reagent is deposited. Remove the tubes and shake. If, after shaking, the fluid contains distinct red particles the reaction is positive; if the fluid is uniformly clear (as at the beginning of the procedure) the reaction is negative.

In our experience the test described above never failed to show a positive reaction in a positive serum (controlled by other serological tests and clinical evidence); but there were a few non-specific reactions in possibly negative cases, the reason for which we have not yet ascertained. But since we consider this test as a preliminary for excluding negative sera, and since we have controlled positive tests by Kahn, Meinicke or Müller reactions, the few non-specific reactions are not a serious disadvantage. Further research is necessary to determine the significance of the very few cases where the reaction is considered non-specific. It should be pointed out that non-specific reactions were not found in CSF in a relatively small series of 264 specimens of CSF of which 9 were positive. In our experience of 5364 sera and CSFs there was no single case where a positive serum or CSF gave a negative reaction.

—	Kahn	Meinicke	Rapid test
Number of examinations ..	5100	5100	5100
Negative cases	4775	4776	4765
Positive cases	325	324	335 *
Non-specific reactions ..	5	4	10 †

* 5 of the positive rapid test cases which were at the beginning negative in the Kahn and Meinicke test proved subsequently to be luetic.
† 3 of the non-specific Kahn positive sera (after childbirth) were also positive by the rapid test.
The non-specific positive Meinicke sera were negative by the rapid test.

1. Ide, S. and Ide, T. *J. Lab. clin. Med.* 1936, **21**, 119.
2. Kline, B. S. *Amer. Soc. clin. Lab. Tech.* 1934, **1**, 4.
3. Laughlen, G. F. *Canad. med. Ass. J.* 1935, **33**, 179.

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In several early cases the above rapid test was positive while the Kahn and Meinicke were still negative; a few weeks later the same sera gave a slight positive Kahn reaction and this finding indicates the sensitivity of the rapid test.

The above table shows the comparative results of this rapid test and other serological reactions.

SUMMARY

A simple rapid flocculation test for the serodiagnosis of syphilis is described.

The test is suitable for the examination of both serum and CSF.

FREQUENCY OF MICTURITION AND ALBUMINURIA IN SERVICE PATIENTS

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THE purpose of this paper is to draw attention to a clinical condition noted among Service patients, comprising frequency of micturition, albuminuria, urine sterile upon full bacteriological examination but containing a deposit of blood, leucocytes or epithelial cells, and found upon cystoscopic examination to be associated with macroscopic changes in the bladder mucosa. Pain is felt either in the lumbar areas or in the hypogastrium but there is no constitutional disturbance. The condition is associated with severe physical strain and tends to spontaneous cure with rest.

This syndrome has been noted in 11 Service patients treated during the past nine months in Oldmill Hospital, Aberdeen.

CLINICAL CONDITION

The patients were all in the third or fourth decade of life, and had been in the Services for some months. Slight frequency of micturition manifests itself as the earliest symptom, diurnal at first, and later nocturnal. At first the man rises only once every few nights, but insidiously the condition progresses until after a few weeks he may be called to the lavatory hourly. There is no urgency, incontinence or strangury, and no difficulty in starting the stream or dribbling at the end of the act. On each occasion the output is small and there is no polyuria. The phenomenon of nocturnal polyuria, commonly observed in pyelonephritis, is absent. Loss of sleep renders the patient irritable, and he may become depressed and lose a little weight, while the appetite becomes jaded.

Pain manifests itself at quite an early stage and is of two types. In the first type of case it is felt in the hypogastrium as a constant dull ache not relieved by anything other than rest, and not radiating elsewhere. In some instances there may be pain felt in one or other groin and spreading up to the lumbar areas, in reverse direction from a renal colic. This pain is more severe than the former and is not constant, being subject to remissions. It is relieved by heat. In three cases some pain was referred to the glans penis but here there was an associated trigonitis noted upon cystoscopy. This pain is aggravated by exercise and improves with rest. The patients were all Service men, some from battle schools and training centres, many from training depots, others from the Canadian Forestry Corps and RAF aerodromes or stations. They were all taking strenuous exercise. Over a similar period of nine months no case has been noted in a civilian patient. Exposure to venereal disease has not been admitted by any of the 11 men, and in those cases where a prostatic smear was obtained no gonococci were discovered. The past history has been uniformly good with no relevant information.

Unless treated the condition tends to become chronic but improves rapidly with rest in bed and quiet convalescence.

DISCUSSION

Apart from those cases of frequency with an obvious organic basis, the condition is seen associated with functional and psychopathic disorders in Service patients. It is further observed in the presence of distension of the seminal vesicles and congestion of the lower genital tract. However, here there is no blood or pus in the urine though spermatozoa may be detected, and no abnormality is detected within the bladder through the cystoscope.

Of the various urinary findings, albuminuria is the one constant abnormality, having been present in all cases, without obvious cause. That is to say, 11 patients suffered from albuminuria of unknown origin out of a total of 2143 Service patients treated over a nine month period—an incidence of 0·55%.

It is recognised that—apart from the presence in the urine of pus, spermatozoa, or urethral secretions—albuminuria may be found in adults with no apparent underlying cause. It is more common however in children or in adolescents, in whom it is known as orthostatic albuminuria, or "albuminuria of adolescence"; and it has been established that this is of no serious import and does not lead to future renal disease. The main characteristic of this type of albuminuria is its intermittency, it being absent when the subject is at rest, and when present being associated with the erect posture and exercise. It may be found in the presence of epithelial cells in greater numbers than usual.

Two theories have been postulated to explain the ætiology. Sir Almroth Wright suggests a deficiency in the coagulating power of the blood due to an underlying defect in the calcium metabolism. The second theory postulates venous congestion due to weight of the column of blood in the large abdominal veins plus an alteration in arterial pressure due to deficient vasomotor control. In support of the first theory it may be remarked that there is often a deposit of calcium oxalate or calcium chloride in these cases.

During the war of 1914–18 MacLean[1] investigated the incidence of albuminuria among soldiers. He established that albuminuria per se did not predispose to future nephritis, and that up to the age of 45 or 50 it may have no significance. In his series 60,000 men were examined, 10,000 before training had commenced, and 50,000 after training at Aldershot. The incidence of albuminuria was the same in both groups (5%). Of these cases 3% were slight in degree. The men were apparently healthy. A further 200 were examined before and after considerable exercise and it was found that an initial incidence of 7% unexplained albuminuria rose to 14% after this physical strain.

Insurance statistics permit of a 5% incidence of unexplained albuminuria according to Dukes.[2] Association however with the presence of pus, blood, casts or œdema or other signs of disease precludes classification under the heading of orthostatic. In the cases it was associated with changes in the bladder mucosa upon cystoscopic examination, definite frequency of micturition, pain, and in some cases, pus, casts, oalcium oxalate crystals in considerable numbers and epithelial cells in greater numbers than usual.

These epithelial cells were present in 9 of the men in my series and were in excess of normal. A few of these cells are found in all urines; it may be possible by microscopy to determine from whence they have come, but generally they have been distorted by pressure from the urine and their source is unknown. They are especially numerous in pyelitis, and when urine obtained by ureteric catheterisation is examined, small round epithelial cells may be seen which resemble pus corpuscles. Pus also may be found up to 10 cells per c.mm. in normal urines without pathological significance; but cells to the number of 100–400 per c.mm. are regarded as in excess of normal and reported as being "moderate" in amount.

The more common organisms found in the urinary tract are those of the coliform group, Koch's bacillus, streptococci in short chains, and in addition Friedländer's bacillus, the *Bacillus pyocyaneus* and bilharzia ova. In the cases being discussed the urine was always sterile, and, in 7 in which guineapigs were inoculated the results were negative.

Cystoscopic findings.—The cases could be divided into those showing acute changes in the bladder mucosa and those where the condition had become subacute or chronic.

1. MacLean, H. Modern Methods in the Diagnosis and Treatment of Renal Disease, London, 1927, p. 34.
2. Dukes, C. E. Urine: Examination and Clinical Interpretation, London, 1939, p. 118.

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In all cases there were inflammatory changes in the mucosa, most severe at the base, the fundus usually being normal. In 7 men there were small punctate hæmorrhages in the area of the ureteric orifices, unilateral in all cases, in 4 cases on the right side and in 3 on the left; these were accompanied by a moderate degree of congestion around the trigone.

Where the more acute phase has passed away chronicity is shown by increase in the rugæ of the mucosa, development of small diverticula and diminished bladder capacity—in one case to 4 oz. Deposits of pus and debris may be seen and the efflux from one or other ureter may be cloudy; in this event the urine from the kidney has been found to contain blood (6 cases) and epithelial cells (5 cases). The kidney showing this has been on the same side as the periureteric subepithelial punctate hæmorrhages of the bladder. The outlet may be slightly irregular in its inferior aspect in those chronic cases where there is associated fibrous contraction at the base.

Retrograde pyelography has failed to demonstrate any abnormalities of kidney or ureters, thus verifying the equally constant findings of the intravenous pyelograms.

Treatment.—The main factor is rest in bed, and it has been the custom here, after full examination, and when a tentative diagnosis has been established, to send the man to a convalescent home in the country for three weeks. At the end of that time he reports to the hospital for further examination. He may then be cured, improved or as before. At this time, should guineapigs have been inoculated, the first is killed and it is convenient to have the man report at that time. Where complete recovery has not been effected the man is returned to the country for a further three weeks, at the end of which time he again reports and hears the result of the inoculation of the second guineapig. Should the results be both negative the diagnosis of this present condition is established. By now eight weeks have usually elapsed from the time when he first was admitted to hospital and in most cases the rest and freedom from severe physical strain have effected a cure. The more resistant patients may require a longer period, and where chronic changes have taken place in the bladder some slight frequency may be maintained. Even here, however, the pain and albuminuria have cleared up and the man is able to return to duty.

Various drugs have of course been tried empirically in addition to the rest and convalescent home regime. The reaction of the urine has been altered, various urinary antiseptics have been used, sulphanilamide has been tried, and in 3 cases it was thought that some improvement resulted from a sedative mixture of quinine hydrobromide, ammonium bromide and dilute hydrobromic acid.

It was concluded, however, that the most important factor was rest in bed for four weeks with graduated return to sedentary normal life over the next four week period, and that there was little to choose between the results achieved by the use of these various drugs.

Ætiology.—This condition is noteworthy for its definite association with rigorous physical training. The facts that no other cause can be found to explain the albuminuria, the absence of the condition in civilians, and its presence in active A1 men undergoing battle training, combined with the findings of MacLean in the last war suggest that exercise is the prime factor in the ætiology. This is borne out by the response to rest. It is feasible that the physical stress may induce albuminuria and frequency of micturition. The frequency in its turn may cause reflex bladder irritation with resulting trigonitis, and so initiate a vicious circle which may be associated with the onset of pain. It is possible that a functional element arising from the inconveniences consequent upon the frequency may now develop and help to perpetuate the condition.

Where the urine from the kidneys is clear, it is possible that the deposit of epithelial cells and erythrocytes and pus may arise from this irritative cystitis. However it is not so easy to explain the same findings in urine collected direct from the renal pelvis. Trauma of course can explain the blood, but not the pus corpuscles and casts. Neither is it easy to explain the pain convincingly, especially that felt in the renal regions.

SUMMARY

A syndrome has been described found in 11 soldiers undergoing strenuous physical training. This comprised frequency of micturition associated with albuminuria. Some cases had a deposit of pus corpuscles and epithelial cells in excess of normal, while a few had casts and a considerable quantity of calcium oxalate crystals in the urine. The renal function was unimpaired and full bacteriological and radiological examinations revealed no abnormalities. Examination with the cystoscope showed either changes in the bladder mucosa of acute or subacute type and comprising basal congestion, or subepithelial hæmorrhages near the ureteric orifice on one or other side, or both. There was no systemic upset, and all possible underlying causes of albuminuria and frequency could be eliminated. Pyrexia was absent and the leucocyte counts and blood sedimentation-rates were normal.

Association with exercise has been emphasised and comparison with albuminuria among soldiers in the last war made. Exercise in excess of the man's physical strength has been suggested as the prime factor in the ætiology, and in support of this is the fact that the condition cleared up after six to ten weeks' rest. Drugs had no influence upon the treatment of these patients.

I wish to thank Dr. Harry Ray, MOH, for permission to publish this paper and wish to record my thanks.

COMPARATIVE VITAMIN-C INVESTIGATIONS IN AN INTERNMENT CAMP

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AT present, with restrictions on or complete absence from the diet of certain foodstuffs it is desirable to ascertain the nutritional status of the population. This should be even more valuable if done in a group of people who for some considerable time (2–3 years) have lived on the rather uniform dietary of an internment camp, where there is a possibility of too low a vitamin-C intake. This we have investigated.

In spite of the basic uniformity of the diet this community can be subdivided into several sections varying slightly from each other, thus offering opportunity for comparison. A further comparison was obtained by testing certain sections of the community at different seasons (spring and autumn).

Knowing the difficulties of calculating the vitamin-C content of foodstuffs (Bessey 1938 and others) we will not attempt to give an accurate figure for camp rations. It is derived from vegetables only, as no fruit is available, and calculated in raw material probably exceeds the League of Nations (LoN) daily minimum requirement of 30 mg. How much of this is still available after long cooking, and often delay in serving, it is impossible to say. Lectures and instructions may have lately brought about some improvement in these two failings.

We used the simplified procedure for the vitamin-C urine test described by Harris and Abbasy. This method has been criticised but Harris (1942) has refuted these criticisms, and the method can be considered as sufficiently reliable. Because of technical difficulties and lack of material the saturation test was not carried out beyond 3 days.

We divided the community into the following five groups, taking a representative number from each, since it would have been impossible to test every individual:

1. Members of the camp living on the provided camp rations only.
2. Men working on farms where they have their principal meals provided.
3. Persons able to obtain additional foodstuffs as allowed by the regulations.
4. Official camp personnel in charge of the camp, who obtain the foodstuffs available to the Isle of Man population.
5. Patients and internee staff at an Internment Hospital.

Resting level.—We shall not give figures of resting levels since these were not ascertained in all cases, and the resting level alone is of little value in assessing vitamin-C nutrition. Our limited experience here confirms the

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views of Harris and Abbasy (1937), Gordon and Wormall (1942), and others.

Saturation test.—Standard test doses (700 mg. per 10 st. of body-weight) of ascorbic acid were given daily, and the number of days counted until the body's reserves were approaching saturation. This stage is indicated by a rise in the urinary excretion of ascorbic acid to about 50 mg. per 10 st. The standard now accepted for this test is as follows:

No saturation before 10 days shows a severe degree of vitamin-C deficiency approaching scurvy.

Saturation within 2 days shows a diet probably at least complying with the LoN minimum requirement of 30 mg. per diem.

Saturation in the intermediate days shows an intermediate degree of vitamin-C subnutrition.

By testing for 3 days only we were able to find the number of people below the accepted optimum standard of vitamin-C intake without having the opportunity to assess the intermediate degrees of vitamin-C subnutrition, which extension of the test over 10 days provides. This fact need not detract from the value of the investigations for the purpose of comparison between different sections of the community, and also between different seasons.

TESTS IN SPRING

People living on camp rations gave a poor result (table I, group 1). Out of 7 tested none was saturated in 2 days, and only 1 on the third day. This man is of interest because he habitually, and nearly all day long, chews grass. The rest of those tested were still unsaturated on the third day.

The farm workers (group 2) were equally poor in the tests, only 1 being saturated within two days. As they had precisely the same meals as the farmer this poor result may be indicative of the vitamin-C nutrition of a large section of the population; according to Harris, even in normal times half the population receive less than their optimal requirement of vitamin C. This is probably brought about by lack of understanding of the importance of vitamins, which results in the consumption of too few and overcooked vegetables. The farm worker saturated on the second day (case 14) is also a habitual chewer of grass, like case 4. Seeing that the vitamin-C content of fresh green grass is 60 mg. per 100 g., or almost the same as lemon juice, this need cause no surprise.

The importance of "vitamin consciousness" is shown by the findings in group 3, members of which supplement their camp rations by salads and other raw vegetables. Out of 8 tested 6 were saturated on the second day.

Results in group 4 further stress this point. The members of this section lived on the then rather unrestricted dietary of the Isle of Man population, and yet gave poorer results than the people on camp rations supplemented by salads and raw vegetables. The camp personnel even obtained part of their vitamin C in fruit, but probably neglected the proper use of vegetables. Of 8 tested 1 was saturated on the first day, and a further 4 within three days, while 3 remained unsaturated on the third day.

The poorest result was obtained in group 5—patients at an Internment Hospital. Out of 12 tested none was saturated within three days. Only one of the patients (case 35), suffering from duodenal ulcer, lived on a restricted diet, and his figure was the lowest. The others were having the same rations as the camp, and some had additional milk, eggs and bacon. This experience of low vitamin-C intake in hospital patients is not surprising, and has been observed even in normal times (Harris et al. 1936). As some cases were suffering from pulmonary tuberculosis they may demonstrate the considerable wastage of ascorbic acid found in such cases by Abbasy and his colleagues (1937). The very low vitamin-C intake of patients on gastric diet, unless specially supplemented, is also well known.

TABLE I—MEMBERS OF 5 GROUPS, TESTED IN SPRING

Case	Vitamin C in urine		
	Day—1	2	3
	mg.	mg.	mg.
GROUP 1—PEOPLE ON CAMP RATIONS			
1	6·5	12·7	..
2	6·4	7·0	..
3	3·5	7·3	7·3
4†	4·0	7·5	70·0 S
5	3·0	5·1	11·0
6	3·7	2·7	5·4
7	2·7	7·5	5·1
GROUP 2—FARM WORKERS*			
8	1·5	4·2	..
9	3·8	13·1	..
10	5·5	2·3	..
11	5·0	6·5	..
12	4·2	3·7	..
13	4·9	17·0	..
14†	6·5	87·0 S	..
GROUP 3—PEOPLE ON SUPPLEMENTED RATIONS			
15	53·0 S	..	..
16	2·9	4·5	5·1
17	140·0 S	..	..
18	2·8	6·2	25·0
19	132·0 S	..	..
20	50·0 S	..	..
21	5·2	166·0 S	..
22	14·4	100·6 S	..

Case	Vitamin C in urine		
	Day—1	2	3
	mg.	mg.	mg.
GROUP 4—CAMP PERSONNEL			
23	5·3	1·7	12·7
24	2·7	1·7	93·3 S
25	4·5	10·0	70·0 S
26	5·6	40·0	100·0 S
27	3·0	4·3	5·6
28	7·0	30·8	143·0 S
29	57·0 S	..	..
30	1·8	1·7	6·9
GROUP 5—HOSPITAL PATIENTS AND STAFF			
31	3·0	2·5	6·0
32	4·0	3·0	40·0
33	3·7	3·7	4·1
34	2·0	3·0	6·5
35	0·6	1·4	1·6
36	3·0	4·7	31·0
37	5·6	9·5	20·0
38	4·3	5·3	6·0
39	4·5	4·0	3·3
40	3·1	6·3	4·7
41	2·8	7·7	10·1
42	3·3	3·7	3·4

S=Saturated. †Grass-chewers. *Farm workers could only be tested for 2 days over the weekend.

TABLE II—MEMBERS OF GROUPS 1 AND 5 TESTED IN THE AUTUMN

Case	Vitamin C in urine		
	Day—1	2	3
	mg.	mg.	mg.
GROUP 1—PEOPLE ON CAMP RATIONS			
43	8·0	24·7	116·0 S
44	14·0	186·0 S	..
45	4·0	11·5	15·0
46	6·3	55·3 S	..
47	3·0	50·0 S	..
48	4·5	19·2	96·3 S
49	38·0	72·0 S	..
50	3·0	5·0	8·9
51	3·4	5·3	8·0
52	4·8	14·2	50·0 S
53	3·8	66·0 S	..
GROUP 5a—PATIENTS NOT RECEIVING ASCORBIC ACID			
54	10·0	52·0 S	..
55	10·0	60·0 S	..
56	4·6	7·3	65·0 S
57	25·0	100·0 S	..
58	3·0	5·0	88·0 S
59	10·0	50·0 S	..
60	4·5	5·0	7·0
61	4·0	12·0	58·0 S
62	6·5	5·0	8·0
63	16·0	100·0 S	..
64	13·0	10·0	161·0 S
65	..	..	50·0 S
66	..	..	85·0 S
GROUP 5a—PATIENTS NOT RECEIVING ASCORBIC ACID (*cont.*)			
67	4·5	2·2	7·5
68	5·0	10·0	155·0 S
69	2·5	8·5	100·0 S
70	6·0	11·0	70·0 S
71	2·5	3·0	18·0
72	3·4	4·0	8·0
73	7·0	70·0 S	..
GROUP 5b—PATIENTS RECEIVING ADDITIONAL ASCORBIC ACID			
74	220·0 S	..	..
75	12·0	60·0 S	..
76	7·5	90·0 S	..
77	140·0 S	..	..
78	35·0	53·0 S	..
79	12·0	35·0	120·0 S
80	130·0 S	..	..
GROUP 5c—INTERNEE STAFF AT THE HOSPITAL			
81	85·0 S	..	..
82	72·0 S	..	..
83	93·0 S	..	..
84	6·0	140·0 S	..
85	100·0 S	..	..
86	11·0	30·0	150·0 S
87	100·0 S	..	..

TESTS IN AUTUMN

Members of the two most unsatisfactory groups (1 and 5) were tested again in the autumn of 1942; group 5 was extended to include staff and further divided into three subgroups, namely:

(*a*) Patients not receiving additional ascorbic acid.
(*b*) Patients receiving additional ascorbic acid.
(*c*) Internee staff of the Hospital.

The results fulfilled our expectations and confirm the findings of others (Harris 1942), who report seasonal fluctuations of vitamin C with higher levels after the summer.

Of 11 people living on unsupplemented camp rations 5 were saturated on the second day, and 3 on the third day (table II, group 1); this showed a great improvement on spring results in the same group (cf. table I). The improvement in the most unsatisfactory group—patients at an Internment Hospital—is even more striking. Out of 20 not receiving additional ascorbic acid, 6 were saturated on the second and 9 on the third day (table II, group 5*a*).

After the spring tests instructions for the better use of the natural vitamin-C resources had been given to the kitchen, and the patients had been urged to eat the whole of their vegetable ration, which was often served as a raw salad. During the period between the two tests a number of patients suffering from diseases known to

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show low vitamin-C levels (pulmonary tuberculosis and duodenal ulcer on strict diet) were given additional ascorbic acid (50–100 mg. daily). The results in this group (5*b*) in the autumn tests are very good, 6 out of 7 being saturated within two days and the other 1 within three days. In addition 7 members of the internee staff of the hospital (group 5*c*) were tested. They are all healthy hard-working people, and they were made "vitamin conscious" by one of us who lived with them. Most of them had the ordinary rations, but made good use of their vegetables, and they represent the best group. Out of 7 tested 5 were saturated on the first day, one on the second day, and one on the third day.

Table III illustrates clearly the improvement between spring and autumn in the two most unsatisfactory groups. The quantity of the vegetables supplied in rations is the same in winter and summer, but during summer green vegetables and during winter chiefly root vegetables were supplied. The summer vegetables are probably delivered in a fresher state and have not suffered so much in transit and storage. Further a quantity of

TABLE III—COMPARISON OF SPRING AND AUTUMN FIGURES IN 1942

	Patients in hospital (group 5*a*)	People on camp rations (group 1)	Total	Saturated within three days
Spring ..	12	7	19	1
Autumn	20	11	31	23

green vegetables was grown inside the camp, and these were available for those who otherwise would not have been able to afford them.

SUMMARY

In spring and autumn of 1942 the vitamin-C nutrition of people living in an internment camp and in an internment hospital, and of members of the official camp personnel was investigated by the method of Harris and Abbasy.

It was found that those living on camp rations only gave poor results of saturation after the winter, but that during the summer the vitamin-C nutrition of most of them improved greatly. This poor result after the winter cannot solely be put down to insufficient vitamin-C in camp rations, as it is also shown by those working on farms and having the same food as the farmers. Insufficient use and bad preparation of the vitamin-C resources may contribute to the small intake.

People living on camp rations and supplementing their diet by raw vegetables gave satisfactory results even after the winter.

Members of the official camp personnel living on the normal foodstuffs of the Isle of Man population gave results somewhat better than those of people on camp rations, but not as good as those of internees eating raw vegetables.

The vitamin-C nutrition of the patients in an Internment Hospital was found to be bad after the winter. After the summer they showed great improvement. This was brought about not only by a better supply of natural vitamin-C resources but also by better preparation and serving resulting from instructions to the kitchen. Patients known to be suffering from diseases leading to a low vitamin-C level were receiving additional ascorbic acid, and gave satisfactory saturation results after the summer. The internee staff of the hospital, being "vitamin-C conscious," and making good use of the vitamin-C resources in normal camp rations, gave the best results.

Two people belonging to otherwise unsatisfactory groups, and yet giving good saturation results in spring, are habitual chewers of grass.

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DETERMINATION OF PEPTIC ACTIVITY

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A SIMPLE method for the determination of peptic activity would be of value in investigating the association of peptic hyperactivity with gastric ulcer. The most usual clinical method is with the Mett (1894) tube, though the results are not very accurate and the method has practical objections. In Rose's (1910) modification of the Jacoby-Solms (1907) method, the globulin of the garden pea is employed as the substrate with a range of dilutions of the gastric juice, the result being expressed in arbitrary units. Volhard and Löhlein (1906) used a solution of casein, salting out the unaltered protein with sodium sulphate and titrating the products of digestion with standard alkali solution, the titration result being squared in accordance with the Schütz-Borrisow law. Anson and Mirsky (1932) added the juice to a hæmoglobin solution, removed unaltered protein with trichloracetic acid and estimated the digestion products colorimetrically with tyrosine as a standard, using the phenol reagent of Folin and Ciocalteau. The hæmoglobin solution is not easy to prepare. The simple X-ray plate method for tryptic digestion cannot be used for pepsin because the gelatin is hydrolysed at 37° C. by 0·4% hydrochloric acid.

In this paper a simple method of determining peptic activity is presented in which the result is expressed quantitatively in terms of protein digested instead of in arbitrary units. The range of dilutions suggested has been found satisfactory in practice and the quantities of juice, protein and reagents have been adjusted to correspond to the Grey's 1930, 1932 proteinometer method so that the estimation of the residual protein may be made immediately by this method, used in many clinical laboratories for the determination of cerebrospinal fluid protein.

TECHNIQUE

A range of dilutions of gastric juice in 0·4% HCl is incubated at 37° C. for 30 min. with a solution of serum albumin whose strength has been previously determined. Any residual albumin is then estimated turbidimetrically in the first dilution in which it appears. The quantity of albumin which 1 ml. of juice is theoretically capable of hydrolysing under the conditions of the test is then calculated.

Prepare a solution of serum albumin (BDH), about 100 mg./100 ml. Filter clear, and determine the strength of the solution by means of the Grey's proteinometer. Set up a row of ten small test-tubes (about 2·5 ml. capacity). Into each tube except the first pipette 1 ml. of 0·4% HCl. To the first and second tubes add 1 ml. of gastric juice diluted 1 : 5 with 0·4% HCl. Having mixed the contents of the second tube transfer 1 ml. to the third tube and so on throughout the series, discarding 1 ml. from the tenth tube. This gives a range of dilutions of gastric juice in 0·4% HCl as follows:

1/5 1/10 1/20 1/40 1/80 1/160 1/320 1/640 1/1280 1/2560

To each tube add 1 ml. of the albumin solution. Mix the contents of each tube thoroughly and incubate at 37° C. for 30 min. After incubation add 0·2 ml of 25% trichloracetic acid to each tube. Select the first tube showing a precipitate and estimate its albumin content, transferring its contents to the comparison tube of the Grey's proteinometer.

Calculation.—Suppose the dilution of the juice in the first tube showing a precipitate was 1/640. The albumin solution before use was found to contain 60 mg./100 ml. Residual albumin in the tube was found to be 20 mg./100 ml. (i.e., the albumin in that tube was reduced from 0·6 mg. to 0·4 mg.). Then 0·2 mg. of albumin was hydrolysed by 1 ml. of 1/640 gastric juice.

That is, 0·2 × 640 = 128 mg. of albumin are hydrolysed by 1 ml. of gastric juice. Peptic activity of sample: 1 ml. hydrolyses 0·128 g. albumin in 30 min. at 37° C.

I wish to thank Dr. W. Arklay Steel, superintendent of the hospital, for permission to publish this method.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

AT a meeting of the section of medicine on March 23, with Dr. GEOFFREY MARSHALL presiding, Captain JOHN W. BROWN, MC, USA, opened a discussion on

Primary Atypical Pneumonia

Since 1935, he said, many cases of pneumonia have been described which cannot be classed with the classical lobar pneumonia or bronchopneumonia types. All the early cases recorded were mild and they were mostly in young people, but in some outbreaks the infection was severe and fatal. Thus at San Francisco in 1940 a patient was admitted to hospital and died; three nurses who looked after him took the infection and two of them died. Three doctors in the pathology department who examined the organs of the fatal cases also contracted the infection and were ill for several months. In America there has been a yearly increase in the incidence of atypical pneumonia, which may mean that it is more often recognised, or that it is a new disease which is spreading. He thought the second alternative unlikely because similar cases have been described from time to time in the past. The onset is usually insidious with cough and cold; fever usually lasts 7–15 days and convalescence is longer than the illness seems to warrant. Symptoms resemble those of influenza, with malaise, chilliness, cough, scanty sputum (not bloodstained), and pain in the chest. X rays show lesions in the lung. No organism deserving blame can be found in the sputum, and the blood-culture is always negative. The white blood-count is normal or slightly raised. The lung lesions, as seen in the radiogram, begin at the hilum and spread to the periphery. The epidemiology is still in doubt, though the contagion is thought to spread from patient to patient and there are clearcut instances, like the one quoted, of transmission. Chemotherapy does not affect the course. The pathology is nearly identical with that of psittacosis—a diffused hæmorrhagic interstitial bronchopneumonia. In the last two years the study of non-bacterial agents causing pneumonia has advanced. The existence of influenza A and B viruses has been established; another type, not isolated, has been designated influenza-X virus. The rickettsia of Q fever also causes an "atypical pneumonia," and so does psittacosis. The last is important because psittacosis virus has lately been demonstrated in birds other than parrots, including petrels, poultry, and pigeons. In the series of 6 cases with 3 deaths already mentioned, pigeon psittacosis virus was isolated. In another series of 45 atypical pneumonias, psittacosis virus was demonstrated in 10. The virus of lymphogranuloma venereum can be responsible for pneumonic symptoms, as also for meningo-encephalitis. Recently a virus has been isolated from the cotton-rat; and cats have been found to harbour a virus like that of psittacosis. In most cases of primary atypical pneumonia there are no definite signs of consolidation, but the diagnosis must be clinical and radiological. Captain Brown has stored the sera of 75 cases, however, and hopes to be able to test them against any viruses discovered in the future. In an influenza-A outbreak he found no increase of atypical pneumonia. Conversely, during three weeks in January, 1941, he saw 50 cases of respiratory disease in a small group of soldiers, 30 of whom had been found to have lung lesions on X-ray examination, and none of these cases was due to influenza virus A or B. Since July, 1942, he has seen 143 cases of pneumonia in American soldiers in England, and 102 of these have been primary atypical pneumonia and indistinguishable from the cases seen in America.

Lieut.-Colonel GORDON E. HEIN, MC, USA, emphasised that these cases differ from those seen in the influenza epidemic of 1918; nor, he thought, do they resemble psittacosis as we have known it hitherto. Patients with psittacosis have a patchy, shifting pneumonia, little cough and no sputum; they develop excitement and delirium out of proportion to the severity of the disease; the pulse is slow in relation to the temperature, there is a leucopenia, and the complement-fixation test is positive. In atypical pneumonia, apart from X-ray evidence, physical signs are few. The cough is mild with perhaps a little more sputum than there is in psittacosis. The white-cell count is normal or slightly raised and mental confusion and delirium are not prominent. There may be backache and retro-ocular headache in severe cases. He described four cases which, as he said, could only be described as atypical examples of atypical pneumonia.

CASE 1.—A man of 23, admitted for an injury, developed atypical pneumonia after 23 days in hospital. He had fever and cough, but no frank consolidation of the lungs on clinical examination. On the third day of illness his white blood-count was 10,000 (75% polymorphs). On the fifth day he had photophobia, neck-stiffness and a positive Kernig sign. His white-cell count was 14,000 (75% polymorphs). His cerebrospinal fluid was hazy and contained 380 cells per c.mm. (77% polymorphs, 23% lymphocytes). The sugar content was raised and that of the chlorides lowered; the gold curve was not much changed; cultures were sterile. The temperature soon fell, and a week after the onset the chest was clear though the CSF remained hazy with a high cell-count, now made up entirely of lymphocytes. The symptoms cleared completely 11 days after the onset, though changes in the CSF persisted for some time. This finally became normal and he remains well.

CASE 2.—A man of 34 admitted with a history of 7 days' coryza and sore-throat and a maculopapular rash on the trunk which was not chickenpox. On the 6th day he developed unproductive cough, chilliness and high fever; there were signs of consolidation in both lower lobes. Next day he had headache, neck stiffness, and retention of urine, but he made a complete recovery.

CASE 3.—A man of 27 who was admitted on Nov. 4. On Oct. 1 he had become ill with chills, fever, cough and sputum faintly blood-streaked. His symptoms had persisted in spite of chemotherapy. By Nov. 4 his blood-count was 15,500 (70% polymorphs). X rays showed right central infiltration and this shadow has persisted for many months. Since November he has had tiredness, headache, cough, low fever, a mild leucocytosis, and an increased sedimentation-rate. No tubercle bacilli have been found in the sputum, and other likely diagnoses have been excluded.

CASE 4.—A man of 21. On Dec. 4, 1942, he had chilliness, pain in the lower chest and cough. X rays showed peribronchial exudate at the left base and the shadows persisted until Dec. 23 after which they gradually disappeared.

In cases 3 and 4, Colonel Hein said no adequate explanation of the persistent fever had been found. Both had been fit till the onset of the illness, both had had what seemed to be atypical pneumonia, which however had failed to clear up. Neither was yet fit for work.

The CHAIRMAN thought that crops of these atypical pneumonias appear every 10–15 years. He mentioned Scadding's cases of wandering pneumonia. The atypical pneumonias of today, he agreed, are quite different from the cases of pneumonia seen in the 1918 epidemic.

Lieut.-Colonel W. R. M. DREW said that he had seen 40–50 cases in the past two winters. The fever usually lasts 7–10 days, accompanied by the symptoms already described. In some of his cases the lesions have been extensive, and in some they shifted about, but in none did they last more than 3 weeks. The sputum contained no likely pathogens, and the blood-culture was always negative. He had seen no complications or long fever, and his cases had not been much debilitated by the illness.

Major ERIC SAMUEL discussing the X-ray findings, said that when these cases first began to appear, those showing infiltration at the apex were difficult to distinguish from tuberculosis especially if they were ambulatory and afebrile at the time (as some cases are). This difficulty is greater if only one film is taken; and this is a point to bear in mind, he thinks, if mass radiography is to be applied to the general public. One distinguishing point is that in primary atypical pneumonia it is unusual to see striation radiating from the hilar region.

Colonel L. C. MONTGOMERY, RCAMC, had seen 47 cases of atypical pneumonia and only 7 of lobar pneumonia in the past month. He emphasised the complete absence of signs on physical examination; and students must be taught, he said, that diagnosis, depends on X rays.

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Dr. F. G. YOUNG confirmed the absence of physical signs. Cases seen at Brompton, he said, and diagnosed as tuberculous on the strength of the radiogram, would clear up before they could be admitted to a sanatorium. He thought Colonel Hein's third case would ultimately turn out to be tuberculous.

Dr. J. L. LIVINGSTONE mentioned that in 1939–40 he had seen about 60 cases, probably of atypical pneumonia, in Guardsmen. Unfortunately they were not radiographed. Symptoms cleared in less than 10 days.

Sir HENRY TIDY thought that Scadding's cases had included several different conditions. He considered that cases of primary atypical pneumonia are increasing in number at present, and they are certainly not identical with the pneumonia of 1918. In his student days, he said, his chiefs taught the existence of central pneumonia; but in 1910, when he was working as a pathologist, he never found examples at autopsy and he had believed the condition to be fabulous. But it may have been that round 1900 cases of primary atypical pneumonia were about, and that by 1910 these had disappeared, only to reappear now.

Dr. GREGORY KAYNE described a case sent to a chest clinic with a big apical shadow suggesting tuberculosis; the lesion gradually cleared, however, and when the case came later to autopsy for other reasons no evidence of tuberculosis was found. Another case, a man of 21, had sputum reported to contain tubercle bacilli, yet his lung shadow was fading in the same way; Dr. Kayne suggested that the positive sputum finding was an error and that this case, like the first, was one of primary atypical pneumonia.

Dr. PHILIP ELLMAN described several cases which might in retrospect have been atypical pneumonia. In some of them resolution was delayed. Where a lung shadow failed to resolve, he said, it is necessary to think of carcinoma, abscess, or bronchiectasis with surrounding pneumonia, and of tuberculosis.

Dr. HORACE JOULES analysed 58 cases of pneumonia which he had seen in the past 3 months. Of these 28 were true lobar pneumonias with a pneumococcus that could be typed; 17 had typical pneumonic consolidation but no organism that could be typed; 12 had primary atypical pneumonia. In some of the first group the organisms had been obtained from the blood, not the sputum. Sulphonamides, he thought, may sterilise the sputum but possibly not the lung, and he wondered whether lung-puncture should be done in all cases where the organism could not be obtained in other ways.

Dr. ELI DAVIS in defence of central pneumonia mentioned 4 cases which had had the typical history and chart of pneumonia without the physical signs, and in which X rays had shown consolidation of the lower half of the right upper lobe.

Dr. WILFRED G. OAKLEY described a case of meningitis in a soldier aged 22, in whom the CSF contained 500 cells per c.mm. (75% polymorphs, 25% lymphocytes); chlorides were 640 mg. per 100 c.cm. at the first examination and 560 at the second. Tuberculous meningitis was diagnosed but 2 days later the temperature was normal and though the CSF still contained 400 cells per c.mm. the patient began asking leave to smoke. The radiogram of the chest was normal. Could the meningitis, he asked, be secondary to an atypical pneumonia which had been missed?

In reply Colonel HEIN said that he had seen a good many cases of meningo-encephalitis not associated with atypical pneumonia. They were sometimes associated with mumps or herpes zoster. Meningo-encephalitis following atypical pneumonia, he thought, was rare.

Reviews of Books

Psychology for Individual Education

L. B. MURPHY; EUGENE LERNER; JANE JUDGE; MADELEINE GRANT. Editor: ESTHER RAUSHENBUSH. London: Humphrey Milford, Oxford University Press. Pp. 306. 18s. 6d.

THE teaching of psychology is difficult because exactness in this branch of knowledge seems inversely proportionate to relevance and interest. Most people who are not professional psychologists believe, as we are here told university students do, that "psychology is about people—not about learning-curves, or the nervous system, or even about something called human traits—but about people." But unfortunately, while learning-curves are definite and communicable by university teachers, the mode of conduct of people (including ourselves) is hard to explain and understand. At the Sarah Lawrence College in New York four teachers of psychology have undertaken to give a freshman class—apparently immature girls taking an arts course—some notion of what we know of human behaviour. The material used for this teaching included visits to institutions, juvenile courts and social agencies; directed reading, not only of textbooks in psychology, anthropology and sociology, but also in general literature; participation in group discussions conducted sometimes by social workers and psychologists; observation of children in a nursery school; and individual discussions with their tutor. It has been an optimistic venture which was justified. Although it was not designed to meet the needs of a special group such as medical students would constitute, there is much here to encourage and help those psychiatrists or psychologists who will, in an amended curriculum, have to initiate the future doctor into the intricacies of human psychology.

Nasal Sinuses

An Anatomic and Clinical Consideration. O. E. VAN ALYEA, MD, assistant professor of otolaryngology, University of Illinois, Chicago. London: Baillière, Tindall and Cox. Pp. 262. 36s.

THIS book is attractively printed and illustrated but the same care has not been exercised on proof-reading or diction. It is based on a thorough study of the nasal accessory sinuses as dissected in a large number of skulls, emphasis being laid on the variations in arrangement and size of the ethmoidal cells. The clinical side of the work is unbalanced, disproportionate emphasis being laid on lavage of the various sinuses. While conservative measures are rightly stressed, only vague accounts of the simpler and commoner operative procedures are given. In a book of such small compass it is a pity to cite twelve not very dissimilar case-reports to illustrate frontal sinusitis. Professor Van Alyea quotes freely from published work and gives a large bibliography. The specialist will find much of interest but will be left with a confused impression of what opinions the author supports and what he opposes. The book will not, therefore, appeal to the houseman or registrar.

Principles of Neurological Surgery

(2nd ed.) LOYAL DAVIS, MS, MD. (Chicago, Ill.). London: Henry Kimpton. Pp. 503. 35s.

THE purpose of this book, which has already had a considerable success in America and deserves wider recognition here, is to inform the general medical reader of the present-day possibilities and limitations of neurological surgery. It is a specialised branch of surgery which has been developed since many practitioners left medical school; and even now there are not enough teachers in Great Britain to familiarise the present generation of students with the subject—with the result that the average practitioner has little idea of what can be expected from it. Thus he may be too optimistic in promising a cure to a patient with a malignant glioma; or, remembering the general gloom which attended the diagnosis of "brain tumour" in his hospital days, he may advise against specialist intervention in a favourable case. Professor Davis deals with neurological diagnosis in terms which make no excessive demand on knowledge of anatomy and physiology. Similarly, the various types of intracranial tumours are described in such a manner that the reader is left in no doubt that the classification has a practical as well as academic significance. There are sections on head injuries and their sequels; the surgical treatment of epilepsy; the surgery of the autonomic nervous system; and surgical lesions of the peripheral nerves. Although the author's own experience is the foundation of the book, the copious references to standard works place the whole subject in a fair light, and help to dispel the mystery which hangs about the nervous system for the average doctor.

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THE LANCET

LONDON: SATURDAY, APRIL 3, 1943

RESPONSIBILITY IN HOSPITALS

A FORTNIGHT ago we reviewed the proposals of the Government and various planning bodies for a national health service. We concluded with four points which we regard as matters of principle. One of these concerned the relative positions of the clinician and the administrator. They must, we said, be equal in status and salary, and the parallel staffing system of the voluntary hospital must replace the hierarchal system of the municipal hospital.

We have no wish to enter the controversy as to whether hospital superintendents should be medical or lay. There are good examples of both. But it should be said plainly that hospital administration is a whole-time job, for which special training and experience are needed. To anyone familiar with clinical medicine and voluntary-hospital practice it is patently absurd that one man should be both clinical and administrative chief of a hospital. Yet the lay official of a local authority fails to appreciate this. In each institution, he says, there must be one man who is responsible for everything and everyone; one man to whom I can turn for advice; above all, one man whom I can blame when things go wrong. (And how lay committees love one man to be their servant, to take their orders, and transmit them to the assistant doctors!) The impossibility of this combined clinical and administrative supervision of a large hospital is of course recognised by many medical superintendents. At the Maudsley Hospital the late Professor MAPOTHER had a complete plan for establishing the parallel firm or unit system; but the war destroyed his hopes. Had he succeeded in piloting his proposals through the mental-hospitals committee of the London County Council, the first example of municipal parallelism would have been established. At present, the nearest municipal approach is seen at the Postgraduate Hospital at Hammersmith, where there are various professorial units on the Continental model. But though it represents a great advance on the usual British municipal organisation this type of organisation, assigning several experienced assistants to each professor, means that the higher clinical openings are greatly restricted. If all hospitals were run on these lines, most hospital clinicians would have to look forward to a lifetime of clinical subordination, for there must inevitably be three or four juniors for each chief, and professors are apt to be good lives. It is sometimes suggested that a voluntary hospital, with several medical and surgical firms, does not provide an example of true parallelism, since each firm is itself a miniature hierarchy. Up to a point this is true: no-one would deny that for four or five years—until the registrar or chief-assistant stage is passed—the clinical work of the embryo specialist or consultant should be supervised. But once a man becomes assistant physician or surgeon at a voluntary hospital he is no longer clinically subordinate to his chief. He is a member of the staff in his own right: he holds his own clinics; he has his own beds; at 35, he is clinically autonomous. And it is this autonomy that has made British hospital practice something unique—a benefit alike to patient and practitioner.

By contrast, medical life and practice in the average municipal hospital—whether general, mental, or tuberculosis—presents a sorry picture. A group of middle-aged men, none too well paid, look forward rather dubiously to their chances of medical superintendency. Their clinical senses are blunted by attendance on far more patients than can be cared for conscientiously. After a year or so's struggle, they are apt to devise a technique that enables them to avoid the worst mistakes and to keep their books and forms straight, and gives them enough time to develop a reasonably inexpensive extramedical interest—gardening or golf, photography or fishing. This is no way to practise medicine, but it is the inevitable result of weakening the doctor's direct responsibility for each of his patients. If the Government has in mind an extension of this type of employment for medical men and women, we must pray, for our patients' sake, to be delivered from it.

APTITUDES IN WAR AND PEACE

PROPERLY applied the knowledge being gained about the selection of Service personnel could increase our efficiency as a nation and our happiness as individuals when peace comes; it is gratifying to know that a Cabinet committee has these postwar applications in hand. In the last war the belligerents slowly learnt that the placement of recruits solely by chance, personal preference and the needs of the various branches was a potent cause of breakdown in the fighting machine as well as in the health of its human components; but the lesson was largely forgotten, as BARTLETT[1] was pointing out in 1937, and it needed a mechanised war to demonstrate fully the waste of man-power arising from the assumption that one man is the same as another. In our Services the waste was perhaps most evident in the Army, which had to absorb the greatest number of recruits into the greatest diversity of jobs, and in June, 1941, an Army Directorate of Selection of Personnel was set up, with experienced industrial psychologists to guide it.[2] Since then all recruits, instead of being drafted at once into different units, have been taken into the General Service Corps, where, as REES[3] describes, alongside their basic training they fill in a questionnaire about their experience, education, interests and civilian background, are put through a battery of intelligence and aptitude tests, and have a quarter-hour interview with a non-medical personnel selection officer (PSO). From these findings, with the medical officer's report on the recruit's physical condition, the PSO makes his training recommendation for a broad type of work, such as driving or mechanical maintenance. The PSO can refer doubtful cases, and those difficult to place on grounds of personality or intellect, to a military psychologist. Every soldier's papers now include a sheet (SP 100A) recording his previous career, test results and medical category, the PSO's

1. Bartlett, F. C. Psychology in the Royal Air Force *Roy. Air Force Quart.* 1937, 8, 270, 375; 1938, 9, 60.
2. Myers, C. S. *Lancet*, 1942, ii, 591.
3. Rees, J. R. *Brit. med. J.* 1943, i, 1.

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observations and suggestions for suitable duties, and sometimes the psychiatrist's comments. At the War Office a mechanical sorting system enables each man's sheet to be equated against the demands of the different arms.[4] For this purpose a systematic job-analysis had to be made of the whole Army, and standards drawn up for every member of a tank crew, every gunner, every clerk and so on—a heavy task but one which is bringing results.

When the time comes for demobilisation would it be possible to reverse this selection procedure, so as to give some vocational guidance to those who had no prewar jobs to return to? Civilian occupations would first have to be analysed and grouped according to the physical and mental attributes they require; this has already been done for some and the National Institute of Industrial Psychology has laid down first principles. Presumably the "tradesmen" will be demobilised first, and their replacement in industry will obviously be determined by previous experience and industrial demand. Next will come the turn of unskilled labour, and here some guidance based on Service findings should surely be practicable. This would be especially valuable for the many thousands of dullards and high-grade mental defectives now doing useful manual work in the Army, though they had hitherto failed in a succession of civilian and military tasks. Apart from this direct application, the findings of Service personnel selection should help to place the methods of selecting new entrants to industry on a firmer basis. So far industry as a whole, and the Minister of Labour himself, have not been convinced of the value of psychological tests. A firm of cocoa manufacturers, however, and several engineering firms and instrument-makers used them with satisfaction for years before the war, and they are now to be applied experimentally at the Ministry of Labour training centre at Leicester. The success of Service selection should stimulate the research needed before its civilian equivalents can be widely adopted.

It is in schools that accurate vocational guidance should be most welcome. Before the war some boys left school with but the vaguest ideas about their intended careers, and the inclinations of parents often proved as unreliable as those of their sons, the final choice being made by a dismal process of trial and error. Careers masters were appearing in the public and secondary schools, some of which—for instance, Quaker schools—had adopted a system of vocational guidance supervised by a visiting psychologist for all leavers. Many boys, too, were receiving guidance from the National Institute of Industrial Psychology. In the elementary schools boys and girls in their last term were interviewed and advised about suitable employment and further education by the "juvenile employment officer" of the Ministry of Labour, or the "choice of employment officer" of the local education authority; this advice was based mainly on school records, and local labour conditions were usually (as perhaps they must always be) the main deciding factor. There are of course two separate problems—guidance, which is telling a boy what sorts of job he is likely to be good at, and placement, which is finding him an actual job; in normal times these must be considered together. For a public or secondary school any effective scheme must include a master trained in vocational guidance, who will size up each boy during his last year, using specific tests as a check on school records, and giving true value to the preferences of boys and parents, and to the report of the school doctor. The Federation of British Industries, in its evidence to Lord FLEMING's committee on the public schools, urged that such masters should have a wide knowledge of the opportunities which industry and commerce offer, and this is where the schoolmaster is likely to be most handicapped; he can know only very broadly the requirements of different occupations. A central organisation would be needed to keep careers masters in touch with employers as well as with the professions, to study conditions in industry, perhaps even acting as an employment agency itself, to devise standard psychological tests to be applied by careers masters and undertake their training, and to follow up results. For the general population this work would fall to local government bodies, who would maintain contacts with schools and employers, supervise group tests in schools through the education committees, and so on; even so, a central office for the country as a whole would be desirable. Some at least of the supply of careers masters could be drawn from the Army DSP sergeant testers, most of whom were formerly teachers.

4. *Army med. Dep. Bull.* December, 1942.

YEAST AS FOOD

"The idea of the use of yeast as a source of food protein for man and the higher animals is not a new one; it has, however, been given renewed emphasis by the exigencies of the food situation during the war."

THIS was written in 1919[1]; it might well have been written today. The Germans were fully alive to the merits of yeast during the last war, when they grew large quantities of it on waste cellulose material and used it for human and animal food. At that time its vitamin value was not appreciated; it was regarded purely as a protein supplement, and it is largely as a protein supplement that it is being advocated now. Yeast protein itself seems to be of high biological value, and can be used as the sole source of nitrogen in the diet of rats[1 2] and chickens.[3] It is particularly valuable, however, as a supplement to the protein of cereals for rats[4] and pigs,[5] and in fact, seems to be equal to casein in this respect. The discovery of the richness of yeast in the B group of vitamins has thrown fresh light on its virtues as a food; it contains more riboflavin and nicotinic acid than any other food, and is also a good source of thiamine, vitamin B_6 and pantothenic acid. Theoretically all this is excellent, but ordinary brewer's and baker's yeasts have one great disadvantage as a food for man—their bitter taste. If yeast was to be used for large-scale human feeding, a strain had to be found which was palatable and pleasant. *Torula utilis*, as specially grown by Dr. THAYSON in the chemical research laboratory of the Department of Scientific and Industrial Research, seems to fulfil this requirement. When dried it appears as light straw-

1. Osborne, T. B. and Mendel, L. B. *J. biol. Chem.* 1919, **38**, 223.
2. Mitchell, H. H. *Ibid*, 1924, **58**, 905.
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5. Macrae, T. F., El-Sadr, M. M. and Sellers, K. C. *Ibid*, 1942, **36**, 460.

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coloured flakes with a slight, not unpleasant flavour. It can be incorporated without fear of detection in biscuits and bread, soups and savouries. Many feeding tests on humans and animals have been carried out with it by workers at the Lister Institute and elsewhere, and the publication of their findings is awaited with interest. It is said to have been acceptable to both children and adults, and digestive disturbances have been rare.

The manufacture of *T. utilis* on a commercial scale in this country is not an economic proposition, for we have no large sources of waste carbohydrate. In the West Indies, however, there is an almost unlimited supply. The yeast can be grown very economically on waste molasses, with ammonium salts as a source of nitrogen. Under suitable conditions it multiplies itself eight times in as many hours.[6] The dried yeast contains 50% protein. A sowing of live yeast equivalent to 1 g. of the dried material can thus be made to produce over 250 g. of high value protein in 24 hours. For whom will this food yeast be specially beneficial? Five years ago a special committee of the technical commission on nutrition of the Health Organisation of the League of Nations recommended the use of yeast "in correcting deficiencies in the diets of tropical and Eastern peoples, which are usually largely composed of cereals."[7] Such a measure would supplement the protein in these diets, which is often deficient both in quality and quantity. As a short-term policy a supply of yeast may also prove of great value in supplementing the diets of the peoples of Europe immediately after the war, since any emergency food relief for the starved populations of occupied countries must of necessity consist largely of cereals. If a soup powder containing dried yeast could be distributed with the cereals, this should provide a tasty and highly nutritious food. The soup powder would have to be palatable if made up with plain water, but local vegetables could be added where available. A product of this type would be useful for all kinds of communal feeding.

MUCUS *VERSUS* ACID

GASTRIC secretion can no longer be regarded as a simple process, regulated by nervous or chemical stimuli, in which the rate of secretion of a juice of constant composition is the main or only variable, but rather as a delicately adaptable mechanism in which the several components of the juice have individually important functions and may be secreted in varying concentrations under varying conditions. This view, advocated by THOMAS[8] of Philadelphia among others, is well supported by observations. The secretory cells of the stomach consist of chief cells secreting pepsin, parietal cells secreting hydrochloric acid of constant strength, and mucoid cells secreting mucus. All these cells may be excited or inhibited by both nervous and chemical means. The vagus, for example, carries fibres which excite different groups of cells according to the intensity of the stimulus, some fibres being presumably more resistant than others. The fibres most readily stimulated provoke a secretion of mucus, which is probably an important factor in controlling the level of gastric acidity. Thus if acetic acid is applied to the gastric mucosa there is an increased secretion of mucus, and a greatly diminished acidity results when acid secretion is later stimulated by histamine.

WOLF and WOLFF[9] discuss this protective power of gastric mucus under three main headings—it offers a protective slippery surface to irritants; it neutralises acid directly in contact with it; and it forms a precipitate under high acid concentrations, so acting as an insoluble continuous membrane over the cells of the gastric mucosa. These workers carried out a series of observations similar to the original researches of BEAUMONT on Alexis St. Martin. In their laboratory one of the cleaners, aged 56, had lived since the age of 9 with a permanent gastric fistula, following complete œsophageal stenosis as a result of swallowing scalding hot clam chowder. This man was in the habit of chewing his food and then spitting it into an ordinary kitchen funnel inserted into the gastric stoma. Fortunately for the observers a considerable area of gastric mucosa had protruded from the opening, so enabling a study to be made under different circumstances of its changes, which could be regarded as essentially similar to those occurring within the cavity of the stomach. The insulating effect of mucus could be tested, and when the mucus secretion was continuously removed by suction a tiny traumatic mucosal erosion artificially produced rapidly developed into a definite ulcer having all the appearance of a chronic peptic ulcer. Moreover, a vicious circle arose in that the eroded areas in contact with gastric juice themselves acted as stimuli to further acid production, so that this looks like being one mechanism involved in the maintenance of the acid secretion in peptic ulcer. The continuous secretion of gastric juice, as distinct from the intermittent digestive secretion, is often greatly increased in cases of duodenal ulcer, and there appears to be a threshold level below which mechanical or chemical irritation of the mucosa—as by an ulcer or experimentally by acetic acid—calls forth an increase of mucus but above which the increase affects only the acid secretion.

These opposing secretions of acid and mucus—as it were the attacker and defender of mucosal integrity—seem to depend not only on the intensity of varying stimuli, nervous, mechanical or chemical, but also on their duration. WOLF and WOLFF made the interesting though not original observation that during emotional conflicts involving anxiety, hostility and resentment—but not actual fear—the gastric mucosa becomes red, engorged and turgid, with greatly increased acid production and exaggerated gastric contractions. During such emotions their patient's stomach lining showed all the appearances of a hypertrophic gastritis; these profound mucosal changes may in fact be diagnosed as gastritis by gastroscopists examining patients under conditions of emotional tension. During this phase of gastric engorgement any trifling trauma, such as stroking the mucosa with a glass rod (or even sometimes no mechanical trauma at all), produced small erosions and bleeding points; with these changes often went complaints of heartburn and abdominal pain. When the stimuli were short lived these erosions rapidly healed under a protective layer of mucus, but if the nervous tension was maintained more lasting effects

6. Fink, H. and Krebs, J. *Biochem. Z.* 1938, 299, 1.
7. *Bull. Hlth Org. L.o.N.* 1938, 7, Extract No. 14.
8. Thomas, J. E. *J. Amer. med. Ass.* 1942, 120, 735.
9. Wolf, S. and Wolff, H. G. *Ibid*, p. 670.

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were produced, and a secondary stimulation of acid and engorgement was set up by the mucosal erosion itself. Thus the gastric hyperactivity of nervous tension depends for its pathological effects on the duration of the tension as well as its intensity. This may be one reason why peptic ulcers develop in one person and not in another under equal nervous strain, the one quickly adapting himself after a transient emotional outburst, the other bottling up his resentment or anxiety and settling down more slowly. The ill effect of sustained, as distinct from transitory, nervous stimulation is confirmed by animal experiments—for instance, though repeated large doses of histamine in the dog failed to produce any peptic ulcers, administration of the drug in a beeswax mixture giving a slow continuous absorption regularly did so.

Annotations

SLEEP, DREAMS AND TERRORS

A GOOD physiological theory should throw new light on pathological findings in comparable fields. Kleitman's evolutionary theory of sleep,[1] which appeared a year or two ago, stands up to this test. He considers that our 24-hour sleeping-waking rhythm is not an inborn characteristic, but has to be learned—acquired in infancy by integrating a lower, diencephalic centre with the activities of the cortex. The cortex matures only gradually after birth, and even after complete development its leadership in regard to sleeping and waking is restricted by the needs of the lower centre. Disorders of this centre, anatomical or functional, form the pathological basis of such disorders as narcolepsy and the hyposomnia and hypersomnia of encephalitis lethargica or of tumours of the diencephalon.

Kleitman, however, did not discuss the relation of his theory to the parasomnias, such as nightmares, night-terrors, somnambulism, teeth-grinding and jactitations. These were discussed at a convention of Californian psycho-analysts at San Francisco in 1940, and their papers have since appeared as a symposium.[2] Though psycho-analysis offers complete theories of early instinctive development and of sleep and dreaming, the contributors mainly confined themselves to illustrative case material, and drew few general conclusions about the nature of sleep disturbances. Freud, it will be recalled, held that sleep provided an escape from the conflicts of reality, but at the same time was a source of fear because in dreams repressed material is released from the unconscious. Comparisons of night-terrors with anxiety attacks and of somnambulism with hysterical twilight states are not illuminating. Many contributors to the symposium confirmed the well-known influence of environment, especially unhappy family life and restless parents, on the child's sleep habits. One quoted the old German proverb "a good conscience is the best pillow"; but added that sleep may be disturbed not only by the pricking of a bad conscience, but by the instinctive temptations too strictly restrained by an overzealous conscience in the day-time.

Kleitman's theory can, however, be used as a satisfactory basis for understanding the parasomnias. The integration of two parts of the central nervous system, one of which—the diencephalic centre—is probably fully developed, while the other, the cortex, is in the process of maturing, must necessarily be a ticklish business. If their coördination is disturbed in the making the two parts may work in some degree independently. Thus the diencephalic centre will induce sleep—as it did before the cortex became active—while the higher centre does not coöperate completely, but remains half awake. Motor phenomena like somnambulism and soliloquy will result; or on a lower motor level, jactitations or teeth-grinding. These anomalies of sleep may be associated with no appearance of emotion; but fear is manifest in night-terrors and may be traced to some sleep-disturbing incident, such as a scene between a drunken father and his wife. In spite of his fear, the child's sleep is not interrupted, being maintained by the primary diencephalic centre.

That some symptoms are commoner during the stage of going to sleep than during deep sleep supports the idea that there is incomplete coördination of function at different levels. The development of the sleep rhythm can be compared with the learning of skilled movements in dancing or skating where so much depends on a good start. Awkward early movements have to be unlearned. Symptoms of faulty integration are often manifest in association with retarded or imperfect cerebral development; hence the clumsy gait and uncouth movements of many mentally defective and psychopathic children. But it is worth remembering that unfavourable psychological and social conditions can also retard integration. Nightmares—which differ from night-terrors in that they waken the patient—are not easy to explain on Kleitman's theory. They are as common in adults as children, and are the most innocuous of the parasomnias. Before accepting the traditional view that a full stomach invites the devil to ride on the dreamer's chest it might be timely to study the impact of Lord Woolton, and all he stands for, on the incidence of British nightmares.

SERODIAGNOSIS OF SYPHILIS

SINCE the introduction of the Wassermann test various other tests have been devised to simplify the diagnosis of syphilis. The flocculation test of Sachs and Georgi was followed by the sigma and Meinicke tests, while the Kahn test is the flocculation test now most commonly employed. Even more rapid tests, where the reagents are mixed on glass slides and the flocculation is immediately observed, have been described by various workers; the Laughlen test is probably the one most used in this country. But these rapid tests have several drawbacks: they are not suited to large numbers of specimens, the antigens do not keep well, the serum must be inactivated by heating immediately before use, tests with cerebrospinal fluid cannot be made, and—most important—some positive sera may not be detected. The paper by Rappaport and Eichhorn which we publish this week is of considerable interest because they describe a simple rapid test for the diagnosis of syphilis which overcomes these objections. Essentially it consists of Kahn antigen which has had an addition of gum mastic, and has been coloured red with Scharlach R stain. Inactivation by heat is unnecessary, for the inactivation is done chemically by means of high salt concentration. The separate components of the finished antigen keep well, and the working antigen, which is easily made up, keeps for about 2 months. The technique of the test is very simple: one drop of serum (about 0·05 c.cm.) is placed in a small tube, one drop of antigen is added, the tube is shaken for half a minute, and a drop of diluting fluid is added and again shaken gently. With a positive serum a strong heavy red precipitate appears; with negative sera the solution remains unaltered. The test can be applied equally simply to cerebrospinal fluid.

Rappaport and Eichhorn show that, in parallel with other methods, the test has never failed to detect a positive serum, and so far has not given any false negatives. In addition, the serum does not need to be heat-inactivated—a great saving of time—while the working antigen remains stable in the refrigerator for a fair period. If reliable components for the finished antigen are made available from a central source, this test will simplify the

1. Kleitman, N. Sleep and Wakefulness, 1940, Chicago.
2. *Internat. J. Psycho-anal.* 1942, **23**, 49 et seq.

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serodiagnosis for syphilis in many laboratories, especially in places like blood-transfusion centres where numerous tests are made and "Wassermann" results are required as a routine.

FRACTURED SCAPHOID

THE treatment of fractured scaphoid is not yet satisfactory, and apart from too brief or imperfect immobilisation the blame is mainly laid on delay in diagnosis. Thus, at the British Orthopædic Association meeting reported in these columns last week Rowley divided 450 Service cases into two groups: those diagnosed within 7 days and those diagnosed later, mostly after a month. Of the 238 cases in the first group 186 united, whereas of the 212 cases in the second group only 57 united. Rowley points the moral—the medical officer must be taught to diagnose the fractured scaphoid early. He has studied 105 bone-graft cases, and of these only 8 were subsequently returned to category A1. The average time with a graft for union to take place was 12 months, and 40 out of these 105 remained un-united. On the evidence it is questionable whether grafting should ever be done in a soldier, for unless the result is perfect he will find it difficult or impossible to use a rifle or handle ammunition. Where there is non-union Rowley advocates a further period of immobilisation, or no more treatment at all. Of 48 cases of non-union further immobilisation led to union in 18. Excision of the fragments has not been satisfactory, and 6 out of 9 cases so treated had to be discharged from the Army. The poor results with grafting are disappointing, for the improved method introduced by Armstrong[1] and Butler[2] held out great hopes. But as Clark pointed out in the discussion of Rowley's paper, this is technically a very difficult operation—in the Air Force all cases requiring such grafting are transferred to one of two surgeons. There must be no arthritis when the operation is performed, and if in grafting the guide position still appears unsatisfactory it is unwise to graft; the operation may, without detriment, still be abandoned. New light was thrown on the problem of the fractured scaphoid by Lambrinudi at the BOA meeting. He says that usually the fractured scaphoid is put up without any form of traction or reduction, and it is not realised that the fracture is often the second stage of a trans-scaphoid peri-semilunar dislocation. The radius, semilunar and os magnum, he explained, are a chain of bones; if the os magnum and semilunar bone are to move together they must be linked, and the scaphoid provides that link. In normal dorsiflexion, os magnum and semilunar tend to move together and there is not much strain on the scaphoid. But if they move in opposite directions there is a breaking strain on the scaphoid. In some cases of fractured scaphoid lateral views show that the semilunar has swivelled forward and the os magnum rotated backwards—a torque or rotating force, arising from the original trauma, and acting through the strong interosseous ligaments, has put a breaking strain on the scaphoid. Lambrinudi has confirmed this mechanism by X-ray observations on the cadaver. He advises that by traction and pressure the fragments should always be reduced before immobilisation is started. This attractive theory was supported by Buxton, who urged that in every case of fractured scaphoid an anæsthetic should be given, and that the plaster applied should be continued above the elbow. He said that ordinary plaster-of-paris used in this site soon becomes sodden with washing and useless as a splint—in the Army they often have to change the plasters once a fortnight—and he hoped that the development of plastics would give us a more efficient immobilising agent. As to the position in which the scaphoid should be put up, Soto-Hall of the US Army, who with a colleague had investigated 70 cases, advocated that the wrist should be put up in radial abduction and 20° dorsiflexion, and that while the plaster is setting upward pressure should be exerted on the palm. In this position the scaphoid shapes itself to the cup of the radius, and the added pressure on the palm will help in the moulding of the fragments.

1. Armstrong, J. R. *Lancet*, 1941, i, 537.
2. Butler, A. A. *Proc. R. Soc. Med.* 1942, **35**, 760.

SCABIES

THE Ministry of Health's film on scabies was shown in advance to the epidemiology section of the Royal Society of Medicine on March 26. Made in conjunction with the Ministry of Information, it is designed for medical practitioners and public-health workers rather than the layman; but apart from a few technical terms it could be readily followed by anyone. It begins with animated charts calling attention to the remarkable increase of scabies before and during this war, and next gives admirable photographs of the *Sarcoptes scabiei* burrowing into the skin and being dug out with a needle. Then there are pictures of the "rash" and its impetiginous sequels, with useful comments on their distribution. The domestic spread of scabies is illustrated by glimpses of the seamier side of home life, and treatment both at home and at a clinic is demonstated. Benzyl benzoate is preferred for the clinic, but sulphur ointment for the home, where the painting of an emulsion on the skin might be less expertly performed. Methods of disinfesting garments are represented, and there are brief talks from an MOH and a dermatologist. The film will not be generally available till the end of April, when its exhibition will be arranged through the BMA and medical officers of health.

IS BREAST-FEEDING WORTH WHILE?

DIFFERENCES of outlook and doubts about what should be matters of fact were revealed at a joint meeting between the diseases of children section of the Royal Society of Medicine and the maternity and child-welfare group of the Society of Medical Officers of Health on March 26. Dr. Mary Crosse opened the discussion on the decline of breast-feeding by referring to the study undertaken for the British Pædiatric Association in Birmingham.[1] The real decline since the Middle Ages both in the number of babies breast-fed and in the duration of feeding was hastened as wet-nurse gave place to feeding-bottle and milk-supplies improved. Comparison of recent years (1938, 1941, 1942) shows no effect attributable to the war. The Birmingham figures, to be published in detail later, show an actual increase in the percentage breast-fed at one month (1938, 87%; 1941, 92·1%; 1942, 92·8%). The proportion breast-fed at three months remains about 50%. The declining infant mortality in spite of this low figure gave point to Dr. A. A. Moncrieff's questions as to the evidence that breast-fed babies do better than bottle-fed, and whether Grulee's Chicago figures of infant mortality in 1934 are still applicable (0·18% breast-fed, 8·4% artificially fed).[2] Dr. Crosse has shown[3] that the neonatal mortality of premature babies does not depend on how they are fed, but in a group followed to one year the mortality for the artificially fed was a further 10%, compared with only 4% for breast-fed. And, as Dr. Donald Paterson observed, hospital wards (and gastro-enteritis units) are filled with bottle-fed babies. Few share Dr. Flora Shepherd's view that it is not economically sound to spend time on the 70% of women with too little breast tissue to produce enough milk, the majority accepting the usual assumptions that most women, given good conditions, can feed their babies, that breast-feeding is best, the ideal period albeit unspecified, and that, whatever statistics show, many mothers anxious to feed their

1. See *Lancet*, 1943, i, 78. 2. *Ibid*, p. 311.
3. *Publ. Hlth*, 1939, **52**, 332.

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babies, and presumably capable of so doing, in fact fail. Some of the contributory difficulties met with in the gap between discharge from maternity hospital and the health visitor's first visit were discussed by Dr. H. K. Waller. Referring to the importance of the draught reflex,[4] he stressed the need for careful management of mothers during the early weeks while the reflex is being conditioned. Impressed by the dangers to lactation of overloading and engorgement of the breast, he had taught mothers at the British Hospital for Mothers and Babies manual expression of colostrum in the last three months of pregnancy. This increased the ease of lactation and reduced breast abscess to one in 4500 consecutive cases. Maternity hospitals and units may well note this figure. The problem of helping the mother in the gap period had been solved in several ways. Closer coöperation between maternity hospitals and health visitors was called for by the matron of the General Lying-in Hospital, York Road. Dr. Helen Mackay said that no baby should be discharged from hospital underfed. The delay to admissions caused by keeping such cases longer in maternity hospitals was countered by evacuation to postnatal convalescent homes. But these failed, according to Dr. Letitia Fairfield, to attract mothers, whose one idea was to get home. In such a home Dr. Saunders Jacobs claimed 98·5% successful lactation. The postnatal clinic especially for babies up to three months old, started in Birmingham, may have increased the percentage breast-fed at one month. Dr. Crosse reported 13% artificially fed at one month in 1938, compared with 7·2% in 1942. This provides a basis for the most practical solution of the "gap" difficulties. Among the curious omissions from the discussion were the value of home helps, of mothercraft classes in girls' high schools, and the effect of breast-feeding and weaning on the emotional relations between mother and baby. The need for further facts is clear. The flying start of the breast-fed baby can hardly be equalled by the artificially fed, but is there evidence of a difference in mortality, morbidity and growth between artificially fed babies, those weaned by three months, and those weaned at nine months? Only with such knowledge can it be decided whether there is an urgent need to convert the mothers who now cease breast-feeding before three months for reasons of convenience.

EXPECTORANTS REINSTATED

Two years ago Perry and Boyd[5] devised a method for measuring the output of fluid from the respiratory tract in anæsthetised cats and rabbits. They showed that under these conditions large doses of certain expectorants (ammonium chloride and carbonate, powdered ipecacuanha and glycerol guaiacolate) increased the rate of output of respiratory fluid. More recently Boyd and his co-workers,[6] using the same technique, have shown that creosote, which is a mixture of guaiacol, cresol and other phenols, increases the fluid output from the respiratory tract, as does guaiacol itself and certain of its compounds, though they add that in view of the large doses used it is questionable if these data on animals should be applied to man. Their doubts are supported by the findings of Alstead[7] on the ineffectiveness of various expectorants under controlled clinical conditions in subjects suffering from chronic bronchitis, but it is fair to add that Boyd's experiments were performed on animals under an anæsthetic, which would be expected to depress the sensitivity to stimulant drugs, including these stimulating expectorants. In a clinical experiment, Boyd and his colleagues found that the daily administration of 1·2 g. of guaiacol glycerol ester to medical students significantly reduced the number of coughs per day during periods when they were suffering from colds, as compared with students receiving a placebo; they suggest that this effect may be due to an increased output of respiratory tract fluid. Their results do not directly contradict those of Alstead, since the observations were carried out on very different types of patients who might well react differently to these drugs, and they seem to support the retention of creosote and other expectorants containing guaiacol in cough mixtures as an alternative to the opium alkaloids.

4. *Lancet*, 1943, i, 69.
5. Perry, W. F. and Boyd, E. M. *J. Pharmacol.* 1941, **73**, 65.
6. Stevens, M. E., Ronan, A. K., Sourkes, T. S. and Boyd, E. M. *Canad. med. Ass. J.* 1943, **48**, 124.
7. Alstead, S. *Lancet*, 1939, ii, 2932; 1941, i, 808.

THE PIPER AND THE TUNE

SINCE its formation in 1879 the chief aim of the Mental After Care Association has been the individual treatment of each patient with a view to complete rehabilitation. At the annual meeting held in London on March 23 several speakers emphasised the value of personal contact if recovery is to be complete and lasting. It was felt that the problem to be faced after the war will be how to find the true relationship between the State, the community and the individual. As the scope of activity of a voluntary association can be seriously hampered by lack of means it was felt that the ideal arrangement would probably be for the State to give financial assistance to the voluntary body, but without the rigid authority over its expenditure which this usually implies. The Bishop of London suggested that while, of course, any voluntary body receiving public money must always give an account of its stewardship, it would be better if the payer of the piper did not insist too strongly on his right to choose the tune. More mutual trust is required, he said, if the postwar world is to be what we hope.

EVOLUTION AND EUGENICS

LEONARD DARWIN, fourth son of Charles Darwin, died on March 26 at the age of 93. He had survived his father 61 years. Charles Darwin was led to form a new conception of the relations of the present to the past inhabitants of the earth. He was loth to publish his views until they were well supported by observation and reason. Leonard Darwin applied the same method, and with the same reticence, to the relations of the present to the future inhabitants of the earth and came to hold strong views on the problems of population and society. For the Eugenics Education Society, of which he was president, he did work that will be fruitful in the years to come.

ECONOMY IN DESOXYCORTICOSTERONE ACETATE

SUPPLIES of desoxycorticosterone acetate are only sufficient for the treatment of Addison's disease, and since the Therapeutic Requirements Committee of the Medical Research Council do not consider it essential in any other condition the drug should be prescribed for that disease alone. For other purposes the committee recommends the use of the natural extract of adrenal cortex, which is made from glands collected in this country.

DRIED PLASMA IN SCOTLAND.—A new plasma-drying unit belonging to the Scottish National Blood Transfusion Association was opened at the Royal Infirmary, Edinburgh, on March 26, by Mr. Thomas Johnston, Secretary of State for Scotland. Under normal conditions the plant will dry 200 bottles of plasma per week, but if necessary the number could be increased to 300 bottles. Blood from two donors is required to provide one bottle of plasma. The plant is the only one of its kind in Scotland and is described as the most up to date of the four plants in the United Kingdom. Its institution has been made possible by a combination of State aid and voluntary contributions. By building up reserve stocks of dried plasma the association will play its part in meeting the demands of the Services.

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Special Articles

THE NURSES BILL

THE main objects of the Nurses Bill, which came up for its second reading in the House of Commons on March 24, are: to implement the Horder Committee's proposal that assistant nurses should be given a recognised status and placed on a roll; to control by licensing and inspection agencies which supply private nurses to the public; and to enable the General Nursing Council to standardise training for sister tutors. Public opinion is evidently widely in favour of these changes, for every speaker in the debate supported the main objects of the bill and criticisms were directed only to relatively minor points. More than 16,000 women holding no official nursing qualification are at present employed throughout the country, especially in hospitals treating the chronic sick and the infirm; the demand for nurses grows yearly with the growth of the health services, and it would be quite impossible to give adequate care to the country's sick without the help of these women. The bill prescribes that the GNC shall form, maintain and publish a roll of assistant nurses, and regulate both conditions of admission to it and the conduct of any examination agreed upon for those seeking entry to it. It is also proposed that a committee of the GNC, to be called the assistant nurses committee, should be set up, to consist of 6 people appointed by the council and 5 representatives of assistant nurses; since there are as yet no enrolled assistant nurses their 5 representatives will in the first place be appointed by the Minister of Health. The bill provides that people who have engaged in practice as nurses and have had appropriate experience before March 17, 1943, shall be admitted directly to the roll, provided they apply within 2 years of the date when the rules agreed upon by the GNC first come into force. It also provides that training shall be carried out either in an institution approved by the GNC or in the service of the Admiralty, the Army Council, or the Air Council. This should meet the needs of those Naval sick-berth attendants to whose plight on discharge we drew attention not long ago.[1]

It is disappointing to note the proposal that an assistant nurse's name should be maintained on the roll only if she pays a yearly fee not exceeding 2*s*. 6*d*. A similar regulation is in force in regard to the nursing register; the result is that the names of a large number of qualified nurses do not appear there because their owners have failed to pay the annual half-crown. A nursing register as complete as the medical register would be invaluable at a time when we are especially anxious to draw on the existing pool of nurses; and it would be well not to put pecuniary obstacles in the way of completeness in the roll of assistant nurses. This point was not raised in the debate.

With certain exceptions, use of the title of nurse is to be restricted to registered nurses and enrolled assistant nurses. The exceptions include "children's nurse"—a term which, as Miss Florence Horsbrugh pointed out, will go on being used despite any law or regulation. They also cover any special class of people whom the Minister authorises to use titles containing the word "nurse." This clause, as Mr. Ernest Brown explained, will enable him to safeguard the rights of mental nurses and tuberculosis nurses.

Some official control of agencies and coöperations supplying nurses has been needed for many years. Some of these agencies are of good repute; but others, less scrupulous, employ large numbers of unqualified women who have had little experience, and send them out to patients at high fees, without indicating that they are unfit to give expert attention. Some agencies, it seems, circularise student nurses who have just passed, or even have failed to pass, their examinations, offering them relatively high pay. Thus the sick, as the Minister of Health pointed out, may find themselves treated at considerable expense by nurses with little or no qualification. The bill provides that any person carrying on an agency must send to everyone to whom he supplies a nurse a statement of her qualifications; and the selection of the nurse to be supplied must be made under the supervision of a registered nurse or a doctor. It is proposed that agencies of the kind should be licensed, and that the local authority granting the licence should inspect the premises and the records of the agency, and have the right to refuse or withdraw a licence if the agency is improperly conducted. Mr. C. G. Ammon, MP (Camberwell, North), pointed out that there was nothing in the bill to prevent an agency which lost its licence in one area packing up and going over the border into the area of the next local authority, and setting up business there. Otherwise the measures proposed were felt to be sound for dealing with unreliable agencies. As Miss Horsbrugh remarked, the better agencies will welcome the bill.

The third section would empower the GNC to make rules governing the training and qualifications of sister tutors. It also contains a clause to enable trained nurses to register now who could have registered under the Nurses Registration Act, 1919, but who failed to do so; this will remove hardship for a few women who did not realise the importance of their opportunity when it was open to them. On the whole the bill is drawn on lines which have the approval of the Royal College of Nursing. At a meeting of the council of the college on March 18 it was held that the Government's suggested restrictions on the use of the term nurse will in effect make nursing a closed profession. The council noted, however, that the Horder Committee's recommendation that inspection should be extended to nursing homes was not included.

1. *Lancet*, 1942, ii, 650.

MEDICINE AND THE LAW

A Verdict of Negligence

THE recent High Court judgment in Crick *v.* Patterson must not be allowed to foster any popular theory that a medical practitioner guarantees his own infallibility and backs himself to make the perfect diagnosis at first sight. It was a case in which the plaintiff claimed damages against a doctor for alleged negligence and unskilfulness in the treatment of his son. The boy, evacuated to Buckinghamshire, complained of the state of his neck and throat on Sept. 5, 1940. The doctor did not at first suspect diphtheria; it was not till the 13th that he took a swab. It was four days before he received the pathologist's report. On the 17th the boy was removed to hospital at Aylesbury, where, in the judge's words, he was found hopelessly ill with diphtheria. He was treated at once with antitoxic serum, but died two days later. The judge found the doctor negligent at least from Sept. 9 when he ought to have seen symptoms which the child's mother had seen on the previous day. He commented on the fact that the doctor was in charge of a diphtheria patient for eleven days and gave no treatment for diphtheria; he also criticised his omission to do anything during the four days of waiting for the pathologist's report. It was impossible, said the court, to say that with earlier treatment the child would have recovered or that his death was attributable to his treatment; but there were very good chances of recovery if he had been properly treated.

A perhaps unusual but by no means unprecedented feature of the proceedings was that the defence offered no evidence. It is for a plaintiff in a civil action, just as it is for the prosecution in a criminal charge, to establish a case to be answered. The defendant doctor, doubtless on grounds that seemed sufficient to his legal advisers, contended that he ought not to be found negligent in the absence of medical evidence. Mr. Justice Atkinson strongly dissented from this submission; if it were sound, he observed, "the trusting public would be hopelessly at the mercy of the medical profession."

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He commented on the silence of the defendant. "It is the first time in my experience," he said, "that a medical man charged with negligence has refrained from going into the witness-box to explain, excuse or throw light on what has happened." He awarded damages of £75 with costs.

It is gratifying to record that a stay of execution was granted pending appeal. It would certainly be a pity if it became a forensic tradition or convention that a defendant, because he is a medical man, must go into the witness-box and call evidence though defendants of other professions and callings would in a like situation be allowed to claim their right to plead that no sufficient case has been made for them to rebut. It would be lamentable if the doctor's vocation exposed him to the forensic duty of clearing himself every time that his professional judgment is challenged. Negligence on the part of a medical practitioner is normally established by proof of what a reasonably careful medical man would do in the circumstances disclosed in the evidence. It will come as a surprise to the profession if such proof can be given by lay witnesses or if the court itself can so far abandon the rule of judicial ignorance as to declare of its own unaided knowledge the standard of due professional care. The fact that, where a patient dies of diphtheria, the medical attendant took no steps to treat him for that disease until the pathologist's report on the swab was available need not be automatic proof of negligence. A mistake of diagnosis does not of itself carry a right to damages. These general reflections may indicate the interest with which the profession will await a review of the case.

Arsenic and Fluorine in Cake

When an analyst examines baking powders and other aerating mixtures prepared from phosphates, he often looks for arsenic. In future, it seems, he must suspect the presence of fluorine also. This warning is to be derived from recent proceedings at Nottingham where the Watford Chemical Co. Ltd. was charged with selling to a local firm of cake-mixture manufacturers acid calcium-ammonium phosphate containing arsenic and fluorine intended but unfit for human consumption. Another charge alleged that the company had given a false warranty in writing. According to the prosecution the local firm, being short of aerating agents for use in cakes and seeing an advertisement in a trade paper, sent to the defendant company for a sample of a new material. The sample duly arrived; it was accompanied by a letter stating that the makers could guarantee that the preparation complied with the Food and Drugs Act. A technical adviser of the purchasing firm tested the sample and found it a good aerating agent but detected a smell of ammonia. A quantity of the mixture was bought and taken into commercial use. The firm's work-girls complained that cakes made with the mixture had a flavour of ammonia; thereafter its use was discontinued. The public analyst gave evidence that two samples of the aerating mixture contained 25 per cent. of acid calcium-ammonium phosphate (ACAP); in a sample of ACAP he found 20 parts per million of arsenic and 2·1 per cent. of sodium silico-fluoride; in a sample of the mixture containing ACAP there were 5 parts per million of arsenic and 0·49 per cent. of sodium silico-fluoride. The final report of the Royal Commission on Arsenical Poisoning named a permissible limit of 1·4 parts per million; the ACAP contained 14 times, and the aerating mixture 3½ times, more arsenic than the limit laid down by the royal commission. As for the fluorides, the ACAP contained 21,000 parts and the aerating mixture 4900 parts per million of sodium silico-fluoride. The witness regarded these amounts as grossly excessive and the substances in which they were found as quite unsuitable for food purposes. Dr. Cyril Banks, MOH for Nottingham, told the bench that he would unhesitatingly condemn foodstuffs containing these proportions of arsenic and fluorine. Counsel for the defendants relied on the fact that the figure of arsenic named by the royal commission as permissible had never been prescribed as a standard in regulations made by the Ministry of Health. In his cross-examination he pressed Dr. Banks to concede that the fluorine would not be dangerous unless taken regularly. The evidence nevertheless established that, even if nobody was likely to eat so much of the cake as to receive a fatal dose, a child might possibly eat enough at one meal to produce symptoms of disorder. The defence also sought to lay on the purchaser the responsibility for testing the substance used in food, since the material might have become contaminated in transit. The bench found the offences proved and fined the Watford Co. £15 with £7 5*s*. 6*d*. costs.

Clinical observations and research have shown that the addition of fluorides to food even in small quantities is undesirable. Their introduction is the more to be deprecated because, if a child should suffer from food thus contaminated, the illness might not come under medical observation and, if the cake were analysed, fluorides might not be searched for. Public health authorities and analysts will no doubt take note of the danger. Under war conditions, with tartaric acid scarce and phosphates of approved origin not easily available, fluorides are finding their way into articles not hitherto regarded as potentially deleterious.

In England Now

A Running Commentary by Peripatetic Correspondents

BECAUSE he was regarded as a bit of a littérateur, they gave the Dean a rather ornate fountain-pen on his retirement. He did not tell them that he had a drawer full of those things (including a pretty one of gold) which he never used since as a littérateur he preferred an honest-to-goodness steel nib and an old-fashioned inkpot. Yet when in a neat little speech he expressed his deep appreciation, it struck me that he spoke with sincerity not without a touch of wistfulness. Although we had been fellow members of the staff for seven years, I had hardly exchanged with him more than that number of words outside purely professional dealings. For with his reputation of a biting tongue, outstanding fluency and a gift for epigram, he was what is generally regarded as unapproachable.

I encountered him a few days later in the library of the Royal Society of Medicine; and emboldened by his demeanour at the presentation asked him how he felt in his newly acquired manumission. I found a warmth and geniality which showed how easily the gold of sentiment may be hidden under a thin veneer of cynicism. He told me that when he had first accepted the office of Dean he had anticipated that the duties were few and unexacting, comprising for the most part the arrangement of studies with appropriate advice to individuals, a subject in which he had supposed himself to be reasonably efficient. He had soon found himself plunged into a maëlstrom of responsibilities. He had been expected to ingratiate himself with influential plutocrats to ensure the financial well-being of the school and provide scholarships, prizes and other endowments. And all his life he had never been able to ask anybody for anything. He was called upon to adjust innumerable difficulties arising from social and pecuniary complications and to impose disciplinary measures which were entirely foreign to his temperament, for he was a moral coward who hated to hurt anybody's feelings. He had had to master the perpetually varying regulations of this, that and the other licensing body, and occasionally to rationalise and dissemble when the interests of his students were concerned; all of which, difficult enough in ordinary times, was a hundred times worse through the adjustments demanded by the conditions of war. And as one who lived by routine—an obsessionist in psychological phraseology—his lack of resource and his bewilderment in emergencies had shown him, he felt, to be a dismal failure.

He had learnt that an intense worker cannot be a good administrator. I thought I understood what he meant. I remembered that he had never been known to miss a lecture, a demonstration, a ward round or a committee meeting. I recalled a legend that when the hospital journal had found itself on the eve of going to press with about a third of the material necessary to fill its pages, he had sat up all night to produce an article of over 5000 words. He said he realised that when he delegated certain duties he was unwilling or unable to leave their performers alone; and that through impatience or lack

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of trust he would often end by taking over the work himself.

He had experienced as his chief difficulty the regulation of admissions to the school. In his own student days he supposed that one applied for admission much as one asked for a meal at a restaurant with the presumption that fulfilment followed as a matter of course. He had found that in the whirligig of time admission had become competitive so that considerable circumspection in selection was demanded. He was ever anxious lest he should fail to recognise the right material in embryo. Moreover, to some the ideal medical school apparently consisted of 15 members, all Rugger Blues—though a few outside Internationals would not be rejected. On the other hand, he was expected to deliver the goods in the shape of examination results. Financial stability was demanded by his finance committee, whose dominating interest was the regularity with which the fees were paid; and occasionally to save trouble he had offered to pay something out of his own pocket. Some objection was at times raised in respect to the inadequate or undue proportion of Welshmen, Scots or Irishmen, and the bogy of anti-semitism was never absent. In a futile attempt to please everybody he had experienced, so he said, the sensations of a mental Cinquevalli juggling simultaneously with a cannon-ball, a pellet of paper and a lighted lamp.

When war broke out the question of reservation arose, and applicants multiplied almost like lower organisms. Every prospective medical student was necessarily suspect: how to distinguish the ideal medical man of the future, the boy with a genuine desire and capacity, from the youth who was seeking in reservation a convenient bolt-hole? To do the young men justice, it was not they who were generally to blame: often they were brought along unwillingly by cautious fathers with plausible stories to flatter, cajole, coerce, or even to bribe him into giving a promise of admission well in advance of the calling-up age.

He left me, and I pondered over this aspect of the situation imposed by the war. The same anxiety does not seem to worry the Law Society; it seems that lawyers may be allowed to dwindle but that a full supply of doctors must be maintained. Clearly the profession cannot be recruited entirely from those over military age or physically unfit or conscientious objectors, whatever conscientious objection may mean. How then to accomplish what is necessary and to play fair? I visualised a medical school some years hence composed of two factions; those who had started at the minimum age, and those who had delayed their entry until the completion of two, three and possibly more years in one of the Services—men handicapped by lack of preparation for study, perhaps even by ill health or worse things. I pictured the antagonism of resentment and contempt on the one hand with shamefaced protests of self-exculpation on the other. I saw too the inevitable competition, the desire to compensate the presumably patriotic for their sacrifices, and I wondered if this could have been avoided. Would it not be possible to put every accepted medical student straightway into uniform and subject him to military discipline? Surely it would not be insuperably difficult to organise his life according to the stage of his career with sufficient application to both elements. This would remove some present and future complaints of injustice, and it would eliminate the doubts of the conscientious young men who feel that civilian dress is a badge of infamy and who may develop a sense of inferiority which will colour their whole lives.

* * *

After three years as a spectator I have come into the war and I have been adjusting to a new point of view and a welter of queer ways and apparently meaningless codes of behaviour. No—codes of values. Justice very high; humanity, altruism, not applicable; courtesy high; buttons and boots much higher still; honesty nil, provided you're not found out. I now have a fantasy rebuilt from a news reel I once saw of Etna in eruption. An enormous semi-solid, pouring, here and there exploding, stream of lava advanced very slowly; and in the face of it high buildings just collapsed and disintegrated. There was no sense of disaster, you had plenty of time to get away, but it was inexorable. I now think we shall win the war for certain, if only because it will take so long, and so much, to stop it. We shall go on, even if the other side has stopped playing. Like the lava, it is so huge that nothing can hold it back. That is only a part of the way I think. I am absolutely glad I came in because I'd have never understood it, or its effect on people, if I hadn't.

* * *

The status of the resident house-officer has not received much attention, I think. Before the war most teaching hospitals and the voluntary hospitals whose reputations were high enough were staffed by young men who were paid nothing or very little. It was an honour to be appointed a houseman at one's hospital, and those who were so base as to expect remuneration for months of heavy work were at liberty to go elsewhere. This system led to a high degree of financial discrimination; and the average prewar cross-section of the resident staff of a teaching hospital showed a large number elected for athletic reasons, or because they were sufficiently wealthy to wait until they were chosen, and a few because of their ability. The advent of the EMS with the creation of large numbers of paid jobs has given independence to the outlook of the newly qualified man, who is no longer a beggar seeking a job but a valuable member of the community for whose assistance many services are clamouring. It seems a good moment to review the whole question of the hospital resident—his pay, his health, his living quarters and food, and the conditions of his work. Have the honorary staffs of hospitals shown enough interest in these things? I think the youngest subaltern in the Army has more sense of responsibility for his men's comforts than the average member of the honorary staff for that of his junior colleagues. In fact, it is the failure of the senior to look on his junior as a colleague that is the crux of the matter; and this is manifested in the lack of interest shown in the mental, cultural and social development of the young doctor both before and after he qualifies. Few can emulate the wide cultural achievement of an Osler, but surely more of our seniors could copy his beneficent personal interest and his standards of hospitality to his students and housemen. The young apprentice to medicine deserves to be treated as a colleague whose development is to be guided and assisted, not as an overgrown schoolboy working as an unpaid servant.

* * *

When I came back to the cottage from that well-rationed job I prepared a feast in my own honour. First I went out and shot a contemplative sitting rabbit, then I dug up some chestnuts that I buried in the garden in October, unhermed a bottle of mushrooms that I dried in the sun about the same time (wizened and a bit umbilical, but they swell to life size in gravy), got my own grown potatoes and carrots and a handful of winter cress, and made my stew, secundem artem. Am I a pig to write this? I think not, for I remember an uncle telling me that a favourite book in Ladysmith was Mrs. Beeton.

While it simmered, waiting the well-chosen moment for each ingredient, I went and cut wood and drew much rain water, for that night I had a mind myself to stew also. The technique of this is to put serried rows of pots and pans round the sitting-room fire and change them at crucial moments, stoking from time to time with logs. I ate my stew out of one large pudding basin to save washing up, and filled it twice; then the thought of food became repugnant to me so that I felt æsthetic and picked up Milton. I enjoyed him for ten minutes, then dived into *Imperial Palace* at the place where I left it a month or so ago. Later on I lay in my bath in the dark, for there is no blackout there, and thought "this rain water makes about the best bath I've ever had." Not quite; there was that bath in camp years ago. We found an old bath, filled it with water, and lit a fire under it. It was magnificent—it got hotter, not colder like this; one could lie in luxury and look out to sea over the port beam or over lovely wooded country to starboard; every now and then smoke and flame belched all round, so that one felt like Elijah without his anxiety about the aerial trip with uncertain destination. Then some boy got boiled and there was a spot of bother—I forget the details. No, perhaps the best baths I ever had were four miles down the river from

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Taupo. There was a boiling spring there and the Maoris had dug a small channel from it, leading to an excavated bath, a stone in the channel regulating the heat. I camped there for a week and used to have my first bath at dawn before starting fishing. Ah. the mists of the morning, the trill of the river, the distant boom of the geysers, the bell bird's clarion, the water eternally hot and sulphurous, which left one's skin like silk : yes, those were the best.

After my bath I came and dried in front of the fire. Why should it take a war with its incidentals of fuel economy to teach us the pleasures of cats and dogs on the hearth-rug ?

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

Sir IAN FRASER opened the debate on war pensions last week in one of the best speeches the House has heard for a long time. Sir Ian's concern for the blinded soldier, to whose noble company he belongs, is well-known, and his advocacy of the ex-Service man's case could not have been bettered. He asked why totally disabled men in this war should be rated for pensions at 37*s*. 6*d*. while in the last war the rate was £2. This arithmetical discrimination, which extends to allowances for dependants, reduces the ex-Service man's pension below a reasonable minimum. If we are to use purely arithmetical standards, Sir Ian reminded the House that according to the Beveridge plan 41*s*. 7*d*. would be reckoned as the minimum necessary for subsistence on scientific grounds. A large house followed the speech with rumbling " Hear, hears " of approval, rising at the end to a cordial approval from all sides which few members receive. Sir Ian read his notes, when he made quotations, from cards typed in Braille.

Lady Apsley made her felicitous maiden speech from beside the Serjeant at Arms, sitting in her wheel-chair. She herself has triumphed over the results of a riding accident, and her advice that we should help the disabled to get back into ordinary life is based on profound and painful personal experience.

The main feature of the debate was expected to be a renewed struggle for the appointment of pensions appeal tribunals. But the Minister of Pensions had already capitulated—in principle—in his reply to a private notice question before the debate began. Even then members were sceptical of the time factor and the Minister's good intentions. When the Minister intervened in the debate to make his own statement he spoke to a critical but not unfriendly House, but he so handled his audience that interruptions were constant. Sir Walter called it at one time cross-talk, but one member was unkind enough to tell him that if he was getting a rather rough reception it was entirely his own fault. Not one member—Conservative, Labour, Liberal, I.L.P. or Independent—and all spoke—supported the Minister. At two points the Speaker had to intervene to get the Minister a hearing. A select committee was asked for to consider rates of pension, parents' pensions, post-disability marriage and allowances, and accidents. Dr. Haden Guest wanted the select committee to consider the definition of attributability and aggravation which he, and many others during the debate, considered in need of definition. But the Minister would not promise a select committee and the House will now await with interest the medical appointments to appeal tribunals which Sir Walter has to make from the list of names supplied to him by the Central Medical War Committee. Before tribunals can come into operation further legislation will be required on the lines of that passed in 1919, when the original tribunals were instituted. The form of the tribunals will presumably be the same—a legal chairman, a medical member and a Service member. There are thousands of cases needing attention and the House hopes the tribunals will soon be working.

The contrast between the ex-Service debate, under the ægis of the Ministry of Pensions and the debate on the Nurses Bill next day, under the ægis of the Minister of Health, was striking. Mr. Ernest Brown spoke quite shortly, and the bill received general approval and passed in a short time. (See p. 439).

The parliamentary programme up to Easter is full, the Budget is to be opened soon, and before that the Catering Bill has to be disposed of, while the Prime Minister's vista of postwar policy opens up the probability of important debates after Easter.

FROM THE PRESS GALLERY

PENSIONS APPEAL TRIBUNALS

ON March 23 the MINISTER OF PENSIONS made the following statement : the Government have promised to set up pensions appeal tribunals as soon as practicable. I have appointed a subcommittee of my central advisory committee to explore this problem. The House will not expect me to anticipate the subcommittee's report which they will make in due course to the main committee. Thanks to the British Medical Association we now have a list of doctors who are willing to serve on tribunals, or on tribunal work in the Ministry. The Lord Chancellor is responsible for tribunal appointments, but it is clearly desirable that my subcommittee should review this list, not with the object of expressing any views on the suitability of a particular individual, but to satisfy itself generally that sufficient doctors of suitable experience can be regarded as available without serious effect on other essential war services. In this connexion I have the valuable help of Lord Horder. He and my own senior medical officers will carefully review the list. I shall then call a further meeting of the subcommittee to consider results in the light of the considered opinion of Lord Horder and his colleagues. If the subcommittee report in favour of the early establishment of tribunals as a practical matter, and the main committee support their view, the Government will review the whole problem in the light of its recommendations. I am as anxious as hon. members that there should be tribunals and the House may be assured that when the Government decide that they can be set up, no time will be lost in giving practical effect to this decision. Replying to questions Sir W. Womersley gave an assurance that he hoped to be able to make an announcement very shortly. When the tribunals were set up they would deal with all cases which had arisen since the beginning of the war.

QUESTION TIME

Pension Cases referred to Medical Expert

Major A. M. LYONS asked the Minister in how many cases, to the latest convenient date, had ex-Service men who had been refused pensions been referred to an independent medical expert ; in how many of those cases had medical examinations been made by that expert ; and in how many cases had the decision of the Minister been reversed and awards made in favour of the appellants.—Sir W. WOMERSLEY replied : The total number of cases of all categories of the present war referred to an independent medical expert is 238, of which 78 have been admitted to pension. These figures include 111 cases of disabled ex-Service men in which pension had been refused and of these 40 were accepted. The expert decided to examine the man in 11 cases.

Major LYONS : In view of that extraordinary disclosure that only 11 medical examinations have taken place, may I ask the Minister whether in those cases where, on attestation it was distinctly stated that the man was not suffering from a complaint for which he was subsequently discharged he would review the whole of the outstanding cases and give a medical examination in every case, instead of the window-dressing which we know now takes place ?—Sir W. WOMERSLEY : I review these cases myself and in the cases I have stated I have sent them without any appeal from the men at all to the independent medical expert. I think that is the best way of dealing with them and I cannot agree with the suggestion of reviewing the whole of these cases. I take note of any case brought to my notice by members of Parliament, the British Legion, or my own war-pensions committees, who are at the moment investigating all the cases in their areas.

Neurosis among Discharged Soldiers

In answer to a question the Secretary of State for War stated that the proportion of men invalided from the Army suffering from neurosis was in 1942 about 17% of the number invalided out of the Army in that year on account of all diseases.

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Recommendations of the Tomlinson Committee

Mr. E. BEVIN informed Mr. R. DUCKWORTH that the Government has accepted the recommendations of the Tomlinson Committee as a basis for discussion with the organisations concerned and these discussions are proceeding. When these discussions have been completed, it is proposed to consider the introduction of the necessary legislation to enable the scheme to be put into effect on the termination of hostilities. A joint committee representing the departments concerned has already been appointed to coördinate the work of the various departments in preparation for the introduction of the scheme.

Mr. T. H. HEWLETT asked the Minister of Labour how many disabled persons were being trained for industrial work and how many for the professions, respectively, under the Tomlinson scheme.—Mr. BEVIN replied: The scheme recommended in the Tomlinson report is designed for the post-war problem but interim measures are in operation to meet current needs. Under these measures approximately 1250 disabled persons are now receiving training for industrial and commercial occupations while about 25 persons are receiving training for the professions or are taking courses of higher education in accordance with a statement which is being circulated today.

Industrial Health

Miss I. WARD asked the Minister whether, in view of the dissatisfaction in the women's world that women's representation was inadequate on his new Industrial Health Advisory Committee, he would take steps to balance his committee, particularly on the industrial, nursing, nutrition and canteen sides.—Mr. BEVIN replied: This is a committee to advise me on technical and scientific matters and not to represent particular bodies or interests. It is therefore a question of personal qualifications and not of balancing the sexes. I am, however, considering the addition of one or two people with suitable qualifications who are women.

Mr. E. W. SALT asked the Minister whether the Industrial Health Research Board was specifically represented on the newly formed Industrial Health Advisory Committee; how liaison would be maintained between these two bodies; whether the new committee was to be concerned with the industrial health research; and whether he was satisfied there would be no duplication of the functions of the two bodies and that there would be no need to alter again the recently revised terms of reference of the board which included the carrying out of research into health and disease of industrial workers.—Mr. BEVIN replied: The board is not specifically represented on my committee. A number of members are common to both bodies and effective contact will be maintained through these members and through official channels. Duplication of functions will be avoided; the board is a research body, whereas my committee will not conduct research and will advise me on technical and scientific problems arising out of the current administration of my department. The terms of reference of my committee were settled with due regard to the revised terms of reference of the board and will not therefore occasion any alteration in the latter.—Sir FRANCIS FREMANTLE: Would it not be useful to have a representative of each body on the other body so that the results of research of one committee might be applied to the other?—Mr. BEVIN: The organisation is so arranged that immediately it ceases to be a thing that can be dealt with currently and needs long research it will be passed on. I think that is the better way of dealing with it.

Silicosis in Foundry Trade

Sir JOHN WARDLAW-MILNE asked the Home Secretary whether any investigation had yet been made as to the extent to which silicosis had been contracted by workers in the foundry trade; and with what result.—Mr. H. MORRISON replied: Certain processes in steel foundries are known to give rise to silicosis, and workers employed in these processes are covered by the compensation scheme for this disease. I have recently received representations that the scheme should be extended to cover other processes—e.g., work done on the foundry floor, which has not hitherto been thought to expose the workers to risk of the disease. Further inquiries are being made, but the results are not yet available.

Dermatitis in Mining Industry

Mr. BERNARD TAYLOR asked the Minister of Fuel an Power what steps were being taken to deal with the increasing number of dermatitis cases in the mining industry.—Mr. TOM SMITH replied: Any epidemic of this disease, however small, which is reported among a particular set of workers at a particular mine is investigated medically in relation to the working conditions, and ameliorative measures taken so far as possible. But most of the cases appear to be sporadic in the sense that they comprise, in ones and twos, workers having many different occupations and employed at many different mines. These cases present a difficult problem which will be further investigated through my medical officers of mines who are now taking up their duties in the coalfields.

Regulation 33B

I am not at present able to say to what extent the compulsory powers conferred by the regulation have as yet been exercised, but I hope shortly to receive reports which local authorities were asked early in January to submit quarterly. (Mr. BROWN replying to Mr. HEWLETT.)

Dr. H. B. MORGAN asked the Minister if the Crown had undertaken to bear the responsibility for costs and damages in the event of a claim for damages being made against a special practitioner giving compulsory treatment under the regulation 33B.—Mr. E. BROWN replied: No.

Venereal Disease in Sweden and Russia

Mr. C. T. CULVERWELL asked the Minister of Health whether he had any information as to the powers and sanctions used in Sweden and Russia with regard to venereal diseases.—Mr. BROWN replied: Full information about the laws and regulations relating to venereal diseases in Sweden is contained in the report on antivenereal measures in certain Scandinavian countries published by the Ministry of Health in 1938 (see *Lancet*, 1938, i, 1352). The information at present available to me as regards Russia is less complete, but I understand that the law of Jan. 24, 1927, provides as follows:

(1) Any person suspected of suffering from venereal disease in a contagious form can be compelled to undergo examination whenever he refuses to submit voluntarily.
(2) The following categories can be compelled to undergo examination and treatment for VD:
(*a*) Those who have been found by the medical authorities to be suffering from VD.
(*b*) Those who in the opinion of the sanitary inspector of habitations are living in conditions liable to infect their neighbours.
(*c*) Those who work in conditions which in the opinion of the sanitary inspector make them liable to infect domestic staff or fellow workers.
(*d*) Those attending schools of the first or second degree or apprenticeship schools whenever it is thought necessary by the school medical officers.
(*e*) Nurses and domestic servants when considered necessary by the public health inspectors.
(*f*) Pregnant women who have been found by the medical authorities to be infected with syphilis.
(3) Punishment for failure to comply is provided for under lists 150 and 190 of the penal code.
(4) According to a regulation of June 14, 1928, measures for dealing with prostitution are under a central interdepartmental committee.

The law also provides for all measures relating to the welfare and rehabilitation of women and girls without work who are suffering from VD. This includes the establishment of work and treatment centres (prophylactoria), of rescue homes, and of homes for pregnant women and their infants.

Pay of Civil Nursing Reserve

Mr. NESS EDWARDS asked the Minister if he was aware of the dissatisfaction in certain South Wales hospitals as a result of the Welsh Board of Health refusing to allow boards of management to pay the same rates of wages to members of the Civil Nursing Reserve as were now to be paid to the normal staff; and, as all these nurses were performing similar duties, would he reconsider the attitude of his department to this problem.—Mr. BROWN replied: The recommendations of the Rushcliffe Committee cannot be automatically applied to members of the Civil Nursing Reserve, whose conditions of service are in some respects different from those of normal hospital staff. I am now reviewing the rates of pay of the reserve, in the light of the recommendations of the committee, but new rates cannot be paid until the review is completed. I expect a decision very shortly. Any changes will operate, retrospectively if necessary, from the same date as the scales proposed by the Rushcliffe Committee for the ordinary staff of hospitals.

Pasteurisation of Milk

Mr. E. W. SALT asked the Minister whether, in view of the conflicting policies which still obtained in regard to the pasteurisation of milk-supplies, he would institute a comprehensive inquiry to establish a final settlement of the issues at stake in the light of all available scientific and economic evidence.—Mr. BROWN replied: I am advised that the

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facts are well known and I do not think that any useful purpose would be served by the course suggested.

Replying to Mr. R. PURBRICK, Mr. BROWN said he could give no undertaking that pasteurisation would not be made compulsory.

Food for Occupied Countries

Mr. EDMUND HARVEY asked the Parliamentary Secretary to the Ministry of Economic Welfare whether the latest reports received on the working of the measures of food relief in Greece under the supervision of the International Red Cross and the Swedish Red Cross continued to be satisfactory; whether dried milk and vitamins were now available for Greece; and whether further measures for controlled food relief for children, nursing mothers and expectant mothers were under consideration for any other countries under German occupation, in view of the increasing suffering amongst the civilian population.—Mr. D. M. FOOT replied: My latest information is that the relief foodstuffs imported into Greece through the blockade have been distributed without interference by the occupying authorities. The Neutral Commission has also entered into certain agreements with the occupying authorities for the protection of Greek native produce, though I am not yet able to say how far such agreements are proving effective for their purpose. The monthly shipments to Greece include condensed milk and the addition of vitamin tablets has also been approved, though none have yet been shipped. As regards the third part of the question, this matter is constantly under consideration. But it is necessary to take account not only of the possible benefit to the persons whom it is desired to help, but also of the benefit, direct or indirect, to the enemy. Replying to further questions, Mr. Foot said that except for the special exception made in the case of Greece our blockade policy remained as stated by the Prime Minister in August, 1940.

Diphtheria in Germany

Such information as is available leaves no doubt that there has been a big increase in the prevalence of diphtheria in Germany. I understand that diphtheria has similarly increased in some at least of the enemy-occupied countries. (Mr. BROWN replying to Mr. F. C. R. DOUGLAS.)

H. J. SUGGARS

SOON after the discovery of X rays four men took up radiography at the London Hospital—Harnack, Wilson, Blackall and Suggars. All became affected by the rays before the risk was appreciated, and all have since died after years of suffering and disability. Radiologists of the present day, using modern protected apparatus, owe much to those who did this initial work, continued it even after they realised what had happened, and never complained. The longest survivor of the London Hospital group was Mr. Suggars, whose death, aged 65, is now announced. He started as a junior in the department and much of his time was spent in the dark-room, but he also took his turn in the radiographic room where one of his duties was warming the glass of the primitive X-ray tube with a small spirit-lamp, while the photographs were being taken, so that rays of the correct penetration were obtained. During this period his face and the upper part of his body were heavily exposed, as well as his hands. Soon chronic dermatitis appeared, but he went on with his X-ray work, and became senior radiographer in outpatients. He was an exceptional technician and medical men used to take their radiographic and photographic problems to him. Later it was thought advisable for him to give up radiography and he then took over the photographic department which he conducted with great success until 1937 when his sight became affected and he had to retire. He was a good radiographer, a good colleague and a courageous man.

THE UTERINE PACK.—Messrs. Southalls, of Birmingham, suggest that for packing the uterine cavity to check bleeding their 'Dalmex brand Southalamide Gauze' has advantages over sterile gauze into which sulphanilamide powder has been rubbed (see *Lancet*, March 6, p. 312). Their product is so made as to ensure an even distribution of the sulphanilamide and to prevent shedding of the drug. Each square foot of gauze contains some 8·5 grains of sulphanilamide. It is sterilised with saturated steam and can be re-sterilised repeatedly without affecting the strength of the medication.

Letters to the Editor

SPECIAL HOSPITALS FOR RHEUMATISM

SIR,—In your issue of March 20, members of the Heberden Society, having stated the case against special centres for rheumatism (chiefly because special hospitals limited to the study and care of ætiologically obscure disorders cannot be defended), proceed to make a plea for a science, and presumably for hospitals, for "the study and care of painful disorders and diseases of the motor system other than those demanding surgical measures only"—whether ætiologically obscure or not. But does the society really wish the new science to take over a large section of what is usually accepted as orthopædic work? Scoliosis, flat feet and other defects of posture, infantile paralysis, rickets, bone and joint tuberculosis are a few of the main orthopædic problems within their definition, of which the treatment is primarily medical.

If the Heberden Society believes that orthopædists are simply manipulators, plasterers, splinters and operators, let them look at the work of British orthopædic hospitals. It is perhaps unfortunate that orthopædists are called "surgeons," when such a small proportion of their work is strictly surgical. Orthopædics has its roots deep in general medicine, preventive medicine and sociology. Even in the purely so-called rheumatic diseases there has been no question of such disorders dissolving out of the matrix of orthopædic surgery, for orthopædics is concerned with the prevention and treatment of crippling diseases and injuries of the locomotor system. In most of the regional orthopædic schemes of the country anything from 30 to 50% of the work could well be called "rheumatological."

Many of us hope for a greater measure of coöperation between orthopædic surgeons and those primarily concerned with the medical aspects of rheumatism, and I for one feel that special hospitals for rheumatism or for orthopædics should be fully staffed by both trained physicians and orthopædic surgeons.

Exeter. NORMAN CAPENER.

NEUROSES AMONG CIVILIANS IN WAR-TIME

SIR,—The prolonged stress of war continues to press on the individual; and, though its nature may alter, its effects are possibly cumulative. Instances of bombing, and problems of evacuation and reception are fewer. On the other hand compulsory service for both men and women in the Forces or the factory is a factor of increasing importance. To prevent undue wastage of recruits in the Services, psychiatric schemes have been evolved to effect adjustments and render the less adapted individual a useful member of his particular branch. This was a sheer necessity. No less imperative is the need of the civilian section, among whom we must remember are all those who have been classified as unfit for any, or for further, military service.

In this connexion there are two main categories to be considered, each falling into two subdivisions:

(*a*) 1. The psychoneurotic.
2. The wounded or injured neurotic.

(*b*) 1. The wounded or injured subneurotic.
2. The employed subneurotic.

The first group we may refer to as patients, but the second group should not be so designated, in so far at least as their mental and emotional state is concerned. This point needs emphasis because official recognition has been withheld from this group from fear of recognising or designating them as psychological invalids. In consequence they have been handled in a way that meets neither their own needs nor the requirements of the community. We can no longer afford to turn a blind official eye on this problem.

For the first group (the psychoneurotic) the provision may be suitable, but is certainly inadequate. Therefore there is need for expansion, particularly in certain neglected areas. It is understood that a survey of existing facilities is being undertaken by the Ministry of Health, so the necessary information for meeting this need should shortly be available.

The needs of the second group raise a much greater problem. These subneurotic people are those who from

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emotional disturbance—often unrecognised as such—are reacting from a social point of view inadequately, and from a medical point of view neurotically. But it would be unjust to style them neurotics and few medical men would be prepared to record such a diagnosis. They include for example men who have been severely injured or disfigured. Many of them do not betray their symptoms while in hospital, but when the rôle of the patient should be discarded and the responsibilities of the citizen resumed, nervous symptoms tend to appear. By an unconscious psychological mechanism they seek to continue the protected and even somewhat illustrious rôle of patient. It was noted in the last war that the severely wounded seldom showed neurotic symptoms before discharge from hospital, but often showed them later.

We owe it to these people to see that they are not left to drift into a life of neurotic invalidism, which is very likely to happen unless psychiatric help is given them. Moreover as a nation we need their services now for the war effort and later on in the work of reconstruction. Full mental as well as physical rehabilitation is required.

In the report of the Inter-departmental Committee on Rehabilitation we learn that the scheme is to be open to all disabled, whatever the cause or nature of their disablement (para. 117 (1)) and also that for persons unfit for immediate employment or training, facilities should be provided for both physical and mental reconditioning (para. 117–14). When, however, we attempt to find out what measures are to be employed to this end, we find that neuropsychiatric services are recommended for the "more difficult cases of neurosis"; less difficult cases—the subneurotic—are apparently to be unrelieved. Rehabilitation is a new word for an old therapeutic concept. So far much has been achieved on the side of physical rehabilitation, but little if anything on the purely psychological side. It would be a misfortune if "rehabilitation" became a new and easy avenue for disposal of obscure or tiresome cases.

In a very few instances full psychiatric rehabilitation services have been made available for patients in the Emergency Medical Service hospitals. Such facilities should be greatly extended and administrative action should be taken to see that the need for such help is appreciated by the medical staff of the hospitals and that they are fully used. Rehabilitation where no pains are taken to seek out and recognise the early symptoms of a subneurotic state is a sham; but were full psychological rehabilitation undertaken, there would be far fewer patients unwilling to continue their surgical treatment than there are reported to be at present.

While the Tomlinson report, already referred to, admits the considerable importance of wastage (absenteeism) due to neurosis (para. 33), it points out that, if hospital treatment facilities are inadequately used, post-hospital rehabilitation is "more serious and extensive" (para. 114 (1)). But there is no recognition of the need for dealing with the disabled who develop subneurotic symptoms. It is reasonable to expect that this group will be just as numerous as those with a frank neurosis.

In the subneurosis group another subdivision must be considered—those whose symptoms are manifested while in employment. These cases are assuming importance now owing to the increased number of people that are "directed" to employment by the labour exchanges. The group consists of individuals, often women, who as a rule are conscientious, but are immature in their emotional development owing to having led a sheltered life with restricted opportunities for making social contacts. Consequently they are very limited in their capacity to adapt themselves to changed circumstances and can only do so imperfectly and with considerable personal stress. Under normal circumstances they themselves find a job for which they are more or less suited, but under present conditions they may be directed to work which, though well within their intellectual and physical capacity, is yet quite unsuitable for them. Before long they show signs of mental ill health characteristic of a subneurotic state—a condition which should be recognised and treated as early as possible to prevent development of a frank neurosis.

Adequate psychological investigation and treatment in the early days would save much individual suffering. Furthermore it would preserve for industry a worker who might otherwise fall out owing to sickness or accident, to both of which the type in question is notoriously prone. Treatment might in some cases take the form of individual psychotherapy; but often—possibly after vocational tests—transfer to a more suitable job would suffice. The important thing is to ensure recognition of the need for dealing with these individuals in the early stages, thus ensuring their continuation at work.

The difficulties in meeting all this need are admittedly serious, chiefly owing to the shortage of adequately trained personnel. Let us at least work out a policy, even if its full execution is for the moment impossible.

ALNESS (*chairman*),
H. CRICHTON-MILLER,
W. J. T. KIMBER,

London S.W.1. The National Council for Mental Hygiene (Inc.).

PREVENTION OF VENEREAL DISEASE

SIR,—It is regrettable that so many of the medical profession dismiss as profitless the psychological aid offered by laymen, whether welfare or clerical workers, who have studied this factor in the problem of venereal disease. The part played by alcohol is also too often overlooked. It is well therefore to remember the wise words of that great physician, William Osler, in whose textbook of medicine this paragraph occurs:—

"Personal purity is the prophylaxis which we, as physicians, are especially bound to advocate. Continence may be a hard condition, to some harder than to others, but it can be borne, and it is our duty to urge this lesson upon young and old who seek our advice in matters sexual. Certainly it is better, as St. Paul says, to marry than to burn, but if the former is not feasible, there are other altars than those of Venus upon which a young man may light fires. He may practise at least two of the five means by which, as the physician Rondibilis counselled Panurge, carnal concupiscence may be cooled and quelled, hard work of body and hard work of mind. Idleness is the mother of lechery, and a young man will find that absorption in any pursuit will do much to cool passions which, though natural and proper, can not in the exigencies of our civilization always obtain natural and proper gratification." (*Osler's Principles and Practice of Medicine.* Semicentennial edition, London, 1942.)

In that charming and popular book of the last war, *A Student in Arms*, Donald Hankey wrote that in his experience continence was usual with three types of men—those who loved a noble woman, those who were devoted to some scientific or similar study, and those who had a deeply religious or idealistic outlook on life.

Devonshire Place, W.1. AGNES SAVILL.

ACCIDENTS IN COAL-MINES

SIR,—The peripatetic correspondent who, in your issue of March 13, described his visit to a coal-mine is to be congratulated on having discovered the most remarkable pit in Great Britain. He was reassured, so he tells us, by the quiet voice of the manager saying "We've had two men killed and eight or nine with compensatable injuries in the last three years" and this reassuring statement seems to have gone far to "give balance" to his previously "morbid, dramatic thinking on the subject."

Lest these unique statistics should induce a sense of undue complacency in the rest of us, it is as well to point out what happens in all the other pits in this country. In them, approximately one-fifth of the men employed receive compensatable injuries every year, and of this number 1 in 25 is so seriously injured that he is totally incapacitated for more than 6 months. So the manager who reassured your peripatetic correspondent either worked his pit with a total of 15 men, or (assuming it to be of more magnificent proportions) had succeeded in lowering the accident-rate to about 1% of the average for the rest of the country. There is, of course, a third possibility: perhaps the manager was just carrying the art of reassurance a little too far.

Mansfield, Notts. E. A. NICOLL.

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TEMPERATURE TAKING

SIR,—I have been disturbed by the failure of clinical thermometers labelled "30 sec." or "1 min." to record the correct temperature in the stated time. This applies to thermometers from reputable makers and those labelled as NPL-tested. I understand that the National Physical Laboratory does not accept responsibility for the accuracy of any statement as to the time of registration of a clinical thermometer and suggests that there is considerable variation in the rate at which the temperature is indicated for different individuals. The 'NPL' mark only implies conformity with certain standards of preparation and accuracy of the graduations.

From my own observations only about one in ten of the "30 sec." thermometers on sale record a correct temperature in less than one minute and most of them require three minutes. Yet I know that many doctors and nurses rely on the label on the thermometer and continually get false readings. This is a menace of which the medical and nursing professions should be warned. It has been suggested to me that the time taken to register the correct temperature depends upon the state of the patient's mouth; if the mouth were kept tightly closed for two minutes before the thermometer is slipped between the closed lips a correct temperature would be rapidly obtained. This is obviously unsatisfactory since most patients are talking to the doctor or nurse up to the time the thermometer is inserted and in practice the suggested precaution is not taken. It is, after all, equivalent to admitting that three minutes are necessary to record the correct temperature.

It should, I feel, be possible to prevent the sale of clinical thermometers bearing these misleading descriptions. The views of manufacturers and of the National Physical Laboratory on the action to be taken would be of interest.

South Mimms, Herts. DOUGLAS MCCLEAN.

PETHIDINE IN OBSTETRICS

SIR,—The papers on pethidine in your issue of March 6 lead me to record the following cases:—

1. A primipara aged 27. Measurements normal. Pregnancy normal. Expected date of confinement Feb. 10, 1943. She went into labour in the early hours of the morning of Feb. 9, and I saw her at 2 PM. Os size of a sixpence. Very tired. Gave hypodermic of morphine hydrochloride, grain ¼, with hyoscine, gr. 1/150. She had about three hours sleep. Labour proceeded very slowly. On Feb. 10 at 5 PM, os the size of florin with thick, hard margins. Rapid pulse, and very tired. Gave intramuscular injection of 50 mg. pethidine. Nurse reported at 5.45 PM that membranes had ruptured. She had had half an hour's sleep, her tiredness had gone; pulse good and though she had regular pains they did not upset her. I saw her at 9 PM, and found os fully dilated, head showing; she was feeling much easier. She delivered herself spontaneously at 9.30 PM. I gave her chloroform, by means of capsules, during last few pains. One other point is that I had to catheterise her just before I injected the pethidine, as the bladder was greatly distended and she could not empty it. She had no trouble in passing urine after the child was born.

2. A multipara aged 39; sixth pregnancy. Expected date of confinement Feb. 17, 1943. During whole course of pregnancy systolic blood-pressure high. Albuminuria began on Jan. 20, and gradually increased. Diastolic blood-pressure never exceeded 82. Great increase of albumin in urine on Feb. 16. I gave quinine and she went into labour at 9 PM on 16th. At 2 PM on Feb. 17, os size of shilling with thick hard edges. Very tired, and rapid pulse. Head very high. Bladder greatly distended, and she could not empty it. Catheterised her, and injected intramuscularly 50 mg. pethidine. She did not actually go to sleep, but after a few minutes she felt much rested, and all tired feeling went away. She had regular pains, but they did not upset her. She delivered herself spontaneously at 10.35 PM. I gave her two or three chloroform capsules just at the end.

A slowly dilating cervix is for patient, nurse and doctor one of the most trying things to deal with. Mother is crying, and her people are agitated. You can do nothing but wait, and it needs tremendous self-restraint to prevent yourself interfering when you should not. If my experience were confirmed by some one with large experience, in a carefully recorded series of cases, pethidine would show itself a great boon to the practising obstetrician. I shall certainly give it further trials, but it would be good to get the experience of those who come in contact with many cases.

Tain, Ross. E. K. MACKENZIE.

GYNÆCOMASTIA AND ASYMMETRICAL ACTION OF HORMONES

SIR,—In your issue of March 20 Mr. Levi asks why, if gynæcomastia be due to excessive production of œstrin, should in his case one breast be affected and not the other. One may well suggest that in a certain proportion (1–10%) of all cases of gynæcomastia in boys and young men one side of the body has reacted more readily towards excess of œstrin than the other. After all, just as one half of the body is occasionally bigger than its fellow, it is probable that one half may be *potentially bigger*, in the sense that certain organs in that half may respond more readily to hormonic or other stimulation than organs in the other half. Under the normal stimulus of pregnancy is it very rare to find that a woman has one breast more enlarged than the other? In some acromegalics excess of the anterior-pituitary growth hormone may act more on one side of the body than the other, even if one cannot speak of "unilateral acromegaly." I do not seek to deny that in some cases there may be an excessive "inherent urge to development"—of the same nature as the normal urge to development of the whole body—which may account for various forms of asymmetrical growth, including rare cases of hemihypertrophy and "true" gigantism of a portion of one hand or one foot. The primitive nervous system seems in some way to be connected with local gigantism; and also with developmental hypertrophy of limbs, in the absence of obvious local causes (such as chronic osteoperiostitis of congenital syphilis). I have several times alluded to the question of occasional unilaterality in the action of hormones and other agents (see Weber and Atkinson, *Brit. Jour. Derm.* 1928, **40**, 454).

Harley Street, W.1. F. PARKES WEBER.

SUPERFICIAL ATRESIA OF THE VULVA

SIR,—From Dr. Spitzer's comments on my two cases I fear that I have failed to make it clear that the condition I was describing has nothing to do with menopausal changes in the vagina.—It is accurately described as superficial, it is confined to the vulva, and since it has been observed at all ages from childhood to ninety-one it would hardly be fair to call it menopausal.

Hove. CONSTANCE OTTLEY.

VITAMIN-C DEFICIENCY

SIR,—On my visit to Canada last summer, after a conversation with Dr. Fred Tisdall, I became interested in testing the urine of children for ascorbic acid. During September–October, 1942, some hundreds of urines were tested, in children attending the outpatient department of the Hospital for Sick Children, Great Ormond Street, and all had ample ascorbic acid present, as shown by the dichlorindophenol test. Since then I have continued to test urines on a much smaller scale. During the last few weeks there has been a sudden and dramatic rise in the absence of ascorbic acid in the urine of children above 5 years of age. The sudden disappearance coincides with the scarcity of brussels-sprouts and apples, which in war-time are two of the chief sources of our vitamin C. This clinical observation suggests that sore mouths and redness about the gums, together with unusual tiredness, will probably show themselves during the next few weeks before summer fruits appear.

I believe we should definitely advise our patients and the public to eat more green vegetables which have been steamed for a short time only, or that they should have them as raw salads. Now is the time to take what fruit juices are available, as well as tinned tomatoes or tomato juice. Potatoes, broccoli tops, watercress, mustard and cress, sprouts, cabbage and cauliflower all contain plenty of vitamin C. Ascorbic acid, 100 mg. daily, is also indicated.

Devonshire Place, W.1. DONALD PATERSON.

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ECONOMY IN SPECTACLE LENSES

SIR,—My council has been considering the difficulty which the Services and the Ministry of Health are experiencing in obtaining spectacle lenses to supply their urgent needs. It has been suggested that the situation could be helped by a simplification of the prescriptions supplied by civilian ophthalmic surgeons, and my council makes the following recommendations:

1. That the prescribing of lens powers in steps less than D 0·25 (which is to say, lens powers commonly referred to as "eighth sights"—e.g., D 0·87) be discontinued.
2. That the prescribing of prisms be reduced to a minimum.
3. That in the higher ranges, say above four dioptres, the prescribing of lens powers in steps less than D 0·5 be reduced to a minimum.

These recommendations were adopted by the Army some time ago, and my council is assured that their wide adoption in civilian practice would materially aid the situation.

Devonshire Place, W.1. FRANK W. LAW,
Hon. sec. Council of British Ophthalmologists.

AN UNEXPECTED CHOLEDOCHOGRAM

SIR,—Sir William Wheeler's interesting case-report in your issue of March 13, recalls to my memory another unexpected choledochogram. In this case no anastomosis had been done and the communication was the result of a perforation of a duodenal ulcer into the common duct.

The patient was an engine driver, 42 years of age when first seen in 1933. He then had a perforated duodenal ulcer, which was treated by suture. For three years he had complete relief of symptoms. In 1936 he came again to hospital with a suspected perforated ulcer. The RMO who admitted him found liver tenderness and suggested the possibility of acute cholecystitis. A barium meal showed a fistula into the common duct and outlined many of the smaller hepatic ducts. At operation a large inflammatory mass was found surrounding the duodenum, but the fundus of the gall-bladder was not involved. Treatment was by high partial gastrectomy, the lower section being made through the pyloric antrum. The man lost all his symptoms and returned to work in a few months. He was demonstrated at a clinical meeting of the Liverpool Medical Institution in 1939.

The case is worth recording for the observation that the liver did not tolerate the duodenal contents, the formation of the fistula being associated with severe upper abdominal pain, pyrexia and liver tenderness.

Liverpool. A. KIRK WILSON.

A METHOD OF FILING MINIATURE RADIOGRAMS

SIR,—It will soon be necessary for the many fluorographic units throughout the country, to deal with thousands of 35 mm. fluorographs. The method of filing should be simple and rapid, and yet allow ready access to any particular frame. In all schemes of mass miniature radiography the frames will be identified by a serial number, and the examinations will be recorded in numerical order. Films also will automatically be filed numerically. There are two main methods of filing.

1. The roll of film usually containing about 100 frames (that being the length which is most suitable for processing) is retained uncut and filed as a complete roll in the original or some other suitable container, which has been marked with the appropriate serial numbers. These containers can then be stored after filing in suitable drawers or racks. Cabinets can be obtained, fitted to contain any number of racks. In Germany the cabinets each contain 1700–1900 frames.

This method is rapid and requires very little storage space, but in my experience has great disadvantages. Repeated projection leads to excessive wear and tear of film. The film ends tend to curl and thus become difficult to insert into the projector. Moreover, unless the repeated films of those who were unsatisfactory at initial examination are given new serial numbers each time they are fluorographed, there is almost certain to be disorganisation of the filing system in the course of time.

2. The film is processed in about 100 frame lengths and then cut into strips each containing 18 frames, which in turn are divided into two smaller strips of 9 fluorographs. These are then inserted into the cellophane envelopes of a 'Minidex' transfer binder and storage unit (model I). This binder consists of a leather or cloth cover, with index card and extension posts, and a number of storage units (each consisting of 18 cellophane envelopes with suitable space for indexing). In this department we use 25 units in each binder, so that each cover contains about 8100 frames. A full binder measures 11 by 3 by 6 in. The free edge has a press-stud clip, and the appropriate serial numbers can be stencilled upon the back, and the binder stored upon a small shelf with the numbers showing. The repeated films of unsatisfactory cases are given original number, which can be cut out of the main strip and filed in the appropriate envelope.

During the exposure of the film, a blank frame is pushed across after every 9th exposure. This facilitates the division and subdivision, and ensures that each strip has sufficient unexposed surface to allow satisfactory projection of the end frames. Again, whenever a patient with a serial number out of sequence with the remainder is examined, a blank frame is put immediately before and after it. This allows for its isolation and subsequent filing in the appropriate envelope.

The advantages of this method more than outweigh the slightly longer time necessary for its use. The films do not wear much, they remain flat, and are readily projected. The individual frame is readily accessible. The provision of the blank spaces facilitates the cutting into strips, and the easy recognition of odd numbers. The binder and storage units are supplied by the Doulton Press, Brent Crescent, North Circular Road, London, N.W.10.

W. G. FITZPATRICK.

Births, Marriages and Deaths

BIRTHS

BAIN.—On March 26, at Caversham, the wife of Lieutenant W. Ivor Bain, RAMC—a daughter.
BUTTLE.—On March 20, at Chichester, the wife of Surgeon Lieutenant R. L. Buttle, RNVR—a son.
FELL.—On March 23, at Colchester, the wife of the late Lieutenant D. W. Fell, RAMC—a daughter.
LEWIS.—On March 20, at Hove, the wife of Surgeon Lieut.-Commander Lewis, RNVR—a daughter.
MILLS.—On March 24, at Ramsbury, the wife of Dr. W. T. Mills—a daughter.
PRICE.—On March 22, at Adlington Hall, Cheshire, the wife of Lieutenant H. C. Price, RAMC—a son.
SANDILANDS.—On March 20, in London, the wife of Captain J. A. J. Sandilands, RAMC—a son.
WOOLLEY.—In December, abroad, the wife of Surgeon Lieut.-Commander E. J. Starbuck Woolley, RNVR—a son.

MARRIAGES

PORTER—EDWARDS.—On March 20, at Hillingdon, Derek Stanley Porter, surgeon lieutenant RNVR, to Phyllis Maud Edwards.
STEINER—ROWAN.—On March 23, at Maidstone, Karl Max Steiner, MB, to Margaret Patricia Rowan.
WINTERBOTTOM—BLAKEY.—On March 2, at Preston, Eric Hare Winterbottom, MB, to Margaret Blakey.

DEATHS

CROSBY.—On March 25, Neville Crosby, MRCS, of Kenton, Middlesex.
ELLWOOD.—On March 23, in London, Victor Thomas Ellwood, DM OXFD.
FERGUSON-DAVIE.—On March 24, at Port Elizabeth, Charlotte Elizabeth Ferguson-Davie, OBE, MD LOND.
HAMMOND.—On March 25, Thomas Edwin Hammond, FRCS, of Cardiff.
HATTERSLEY.—On March 24, Sidney Martin Hattersley, MD CAMB., DPH, colonel late RAMC, of Overy Staithe, Norfolk.
KER.—On March 20, Alice Jane Shannon Ker, MD BERNE, LRCP I & E, in London, aged 89.
LEE.—On March 22, Leonard Newton Lee, MD GENEVA, LMSSA, DTM & H, aged 59.
MCANALLY.—On March 21, at Richmond, Edward Arthur McAnally, MRCS, formerly of Newington, Kent, aged 74.
MACPHERSON.—On March 18, at Balbeggie, Perthshire, John Duncan Graham Macpherson, MB EDIN., lieut.-colonel RAMC.
PRIDMORE.—On March 24, at St. Albans, Herts, Walter George Pridmore, CMG, MB DURH., colonel IMS ret., aged 78.

'ACETARSOL VAGINAL COMPOUND' (Boots) contains acetarsol and boric acid with carbohydrate in tablet form for the local treatment of leucorrhœa due to *Trichomonas vaginalis* or monilia infection.

Messrs. BURROUGHS WELLCOME now issue 'Methedrine,' the dextrorotatory form of the N-methyl derivative of amphetamine, in 1·5 c.cm. 'Hypoloid' ampoules containing 30 mg. of the drug for intravenous, intramuscular or subcutaneous injection. This sympathomimetic pressor agent is primarily intended for administration before or during operation, particularly when spinal anæsthesia is used.

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Notes and News

Medical Service in India

An Indian Army Medical Corps is to be formed. All regular commissioned officers of the Indian Medical Service who are in military employ, and all officers holding emergency commissions in that service, will be seconded to the new Corps, and the entire personnel of the Indian Medical Department and Indian Hospital Corps will be transferred to it.

University of Liverpool

At recent examinations the following were successful:

FINAL EXAMINATION FOR MB, CH B

Part II.—C. Taylor and Simone J. van Son.

Mr. Brown on the National Health Service

Opening a clinic at Watford on March 26, Mr. Ernest Brown, Minister of Health, spoke on the Government's plans for a national health service. In the course of his address, which is reported in the *Times* of March 27, he said that in framing such plans he would place in the forefront the principle of first-class services for all. Every man, woman and child must be able to call to their aid the best services that modern science could provide; every doctor and health worker must have at their disposal the best facilities for full diagnosis and proper treatment. The Government looked confidently to local government, with its long experience and its resilience in meeting the problems both of war and peace, to undertake this new responsibility. The additional task might involve adjustments of its machinery, for the units of organisation must be large enough to allow scope for efficient planning and effective execution.

Another principle which the service must embody was that of personal and professional freedom. Some people thought that an organised national service meant that patients would be dragooned into health and doctors into mediocrity and servility. This was a bogy; an organised service need not involve loss of personal or professional freedom. Health was an intensely personal matter and any national health service must be an intensely personal service.

There was a fear, said Mr. Brown, that the service would bring strict control of the day-to-day work of the practitioner, the rule of forms and routine. This was a danger that could be avoided and not a defect inherent in every kind of national service. The medical services could be organised in such a way that the average practitioner would have freedom to exercise his professional talents in a measure enjoyed at present only by a fortunate few.

Deputation on National Health Service

On March 26 the Minister of Health met representatives of the Socialist Medical Association, who laid before him the views of the association on the organisation of a comprehensive health service. The representatives were: Mr. Somerville Hastings, FRCS (president); Dr. H. Joules; Mr. Aleck Bourne, FRCS; Dr. D. Elizabeth Bunbury; Dr. L. T. Hilliard; Dr. D. Stark Murray; Dr. P. Inwald; and Mrs. Thora Sinclair Loutit.

Precautions against Yellow Fever in Kenya

Mosquito control is now so effective in Kenya that it is thought improbable that yellow fever, if introduced to the colony, could establish itself or assume epidemic form in any urban centre. The latest annual report of the medical department for the colony and protectorate describes an organisation for the control of domestic mosquitoes in every town and port of importance, in all the larger trading centres and along all the lines of communication. Steps have also been taken to ensure the control of mosquito breeding on all steamships and dhows entering Mombasa.

The most vulnerable area is the tropical coastal strip which extends for about 300 miles from Tanganyika to what was formerly Italian Somaliland. This strip, so far as its infestation with yellow-fever mosquitoes is concerned, varies from about 10 to 40 miles in depth and has a population of something over 300,000. An inoculation campaign was started in April, 1941, and by the end of the year the whole population of Mombasa and the country between Mombasa and the Tanganyika boundary had been inoculated. In addition many persons who were likely to travel either to Uganda or to India were inoculated in up-country towns.

Medical Casualties

The following casualties have lately been announced:

Killed.—Captain J. W. Gibson, MB EDIN., RAMC; Captain E. R. Stone, MD, RAMC.

Died.—Captain Kevin Teevan, MB NUI, RAMC.

Missing, presumed killed.—T/Surgeon Lieutenant J. de L. Bourgeois, MD, MONTREAL, RCNVR, HM CUTTER *Hartland*.

Medical Honours

The MBE has been awarded to T/Surgeon Lieutenant N. A. Douglas, MB Glasg., RNVR, for "skill and devotion to duty in tending wounded survivors from torpedoed merchantmen." Surgeon Commander C. A. Downward, MB Sydney, RAN, has received the DSC for "skill, resolution and coolness while serving in HM Australian ships during operations in the Solomon Islands."

Industrial Medical Officer and Family Doctor

At a recent meeting of the Association of Industrial Medical Officers, Mr. J. L. Smyth, whose work in the social insurance department of the Trades Union Congress has brought him into contact with industrial doctors, opened a discussion on this subject. The doctor in industry, Mr. Smyth affirmed, had an immense influence not only on his patients, but in a much wider sphere. He must bring to his work a wide knowledge of people, of processes and of the substances used in various industries, which he should acquire before starting work in the factory. It was the doctor's job to see that the human machinery was properly cared for. He must study such matters as the movement of the worker, the adaptation of benches, lighting and environment, and rest in relation to activity. He should spend a great deal of time in the works rather than in waiting for patients to come to him. The doctor must interpret and bring to the notice of the management the latest results of research in industrial hygiene. In compensation cases the doctor should give his opinion impartially and not be prejudiced either towards the firm or towards the employees, and a works doctor should not hold the position of referee for the local county court. Dr. Frank Gray (Wandsworth), speaking as a family doctor, urged the need for continuity of treatment. Industrial medical officers had special knowledge of factory conditions and their effects on health and of the patient as a factory worker, while the general practitioner understood the patient's home circumstances, his family, his diet, his clothing, and even in war-time the conditions of life of more than half his day.

Infectious Disease in England and Wales

WEEK ENDED MARCH 20

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2160; whooping-cough, 2007; diphtheria, 798; paratyphoid, 8; typhoid, 13; measles (excluding rubella), 19,409; pneumonia (primary or influenzal), 1304; puerperal pyrexia, 173; cerebrospinal fever, 95; poliomyelitis, 3; polio-encephalitis, 1; encephalitis lethargica, 2; dysentery, 66; ophthalmia neonatorum, 103. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on March 17 was 2313, including scarlet fever, 550; diphtheria, 249; measles, 754; whooping-cough, 271; enteritis, 114; chickenpox, 50; erysipelas, 9; mumps, 19; poliomyelitis, 2; dysentery, 37; cerebrospinal fever, 18; puerperal sepsis, 13; enteric fevers, 6; german measles, 21; encephalitis lethargica, 1.

Deaths.—In 126 great towns there were 1 (0) deaths from an enteric fever, 3 (0) from scarlet fever, 41 (5) from measles, 13 (6) from whooping-cough, 15 (1) from diphtheria, 59 (12) from diarrhœa and enteritis under two years, and 52 (5) from influenza. The figures in parentheses are those for London itself.

Cardiff reported the fatal case of enteric fever. Birmingham and Bristol each had 5 deaths from influenza. Birmingham also had 7 fatal cases of diarrhœa. There were 9 deaths from measles at Sunderland.

The number of stillbirths notified during the week was 216 (corresponding to a rate of 32 per thousand total births), including 38 in London.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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CHEMOTHERAPY BY BLOCKING BACTERIAL NUTRIENTS

ANTISTREPTOCOCCAL ACTIVITY OF PANTOYLTAURINE

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THE antibacterial action of therapeutic agents in vitro is not generally regarded as a reliable guide to their effect in vivo, since widely different results can be obtained by varying the conditions of in-vitro testing. Thus sulphanilamide has often been found inactive in vitro against organisms which it inhibited in vivo, and many compounds inactive in vivo are highly inhibitory in vitro. Some cases are explicable by the organism being inaccessible to the drug in vivo or by the drug being activated, inactivated or excreted by the host, but many examples remain in which levels obtainable but ineffective in vivo can be effective in vitro and vice versa. In such cases the problem appears to be one of bacterial nutrition, and the action of sulphanilamide has been studied from this point of view (McIlwain 1942a). The therapeutically successful level of sulphanilamide may or may not be inhibitory in vitro, according to the coincident concentrations of antagonistic compounds, of which *p*-aminobenzoate is the most important. In media containing *p*-aminobenzoate, in the concentrations in which it occurs in animal tissues, the normal levels of sulphanilamide are consistently as active in vitro as they are in vivo. This compound is however more than a drug-antagonist, since it is a substance essential to animals and to bacteria. The action of sulphanilamide depends on its preventing the micro-organism's use of the *p*-aminobenzoate (a normal constituent of parasite and host), apparently by virtue of its structural similarity to *p*-aminobenzoate.

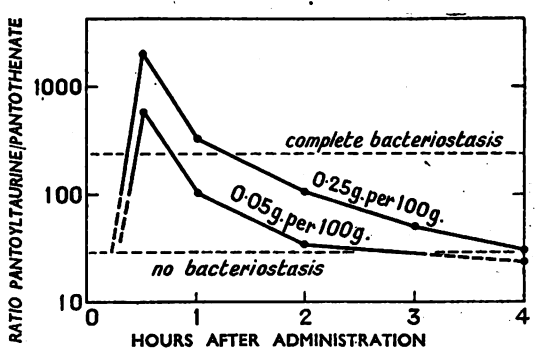
In view of these facts, it appeared possible that bacterial growth might be also prevented by compounds chemically related to other substances essential to bacteria—e.g., pantothenate, which is necessary for growth of many pathogenic organisms. These normally obtain it from the tissues of their hosts. Like *p*-aminobenzoate it is probably also necessary for the growth of animals, and it is present in their blood. Several compounds structurally related to pantothenate were examined, and it was found that pantoyltaurine was the most actively antibacterial in vitro, preventing the growth of hæmolytic streptococci when present in concentrations 200 times those of the coincident pantothenate (McIlwain 1942b). The present paper describes an investigation of the pantothenate contents of the blood of different animals and a determination of the pantoyltaurine levels which can be attained in vivo. From this information the theoretical therapeutic activity of the drug in vivo has been deduced, and has been compared with the actual activity obtained during tests on streptococcal infections of mice and rats.

PANTOTHENATE AND PANTOYLTAURINE ASSAYS

The procedures were adapted from testing conditions under which pantothenate was identified as a growth factor for *Streptococcus hæmolyticus*, and under which pantoyltaurine was found to inhibit utilisation of the compound (McIlwain 1939, 1942b); their specificity is thus well attested, but accuracy is limited by the two-fold dilutions employed. More accurate methods have been recorded by Stanbery and others (1940) and by Pelczar and Porter (1941); values they give, quoted in table II, indicate that the two methods, employing respectively *Lactobacillus casei E* and *Proteus morgani* as test organisms, are not strictly comparable. *Strep. hæmolyticus* and *P. morgani*, as used in the present tests, have given results equivalent within two-fold range. The use of *Strep. hæmolyticus* for assay and for experiments in vivo avoids inconsistencies due to method (such as the utilisation of bound pantothenate under one condition but not the other), but it implies throughout that the molar values given to the results are relative to streptococcus and to *P. morgani*.

Pantothenate.—Blood specimens were collected aseptically, with citrate or oxalate, and laked before testing; serum and plasma were either separated aseptically or filtered to sterilise. Urine was diluted and filtered to sterilise. Specimens were added in two-fold dilutions to a series of tubes of pantothenate-deficient medium which were inoculated and incubated together with a similar series containing known quantities of pantothenate. The test organism for normal specimens was either the Richards strain or a group G strain of *Strep. hæmolyticus*; the medium and other details have been described elsewhere (McIlwain 1939). For specimens containing pantoyltaurine, *P. morgani* (NCTC No. 2818) was used; all inocula were small (about 1000 organisms per 10 ml.) and they were taken from one-day slope-cultures. Growth in media containing 1% or more of blood was followed by microscopic examination; in other cases it was judged by opacity with occasional microscopic control. Known quantities of pantothenate added to blood were correctly determined (table I, B). Values obtained by these methods are given in table II. Administration of pantoyltaurine was not found to alter the blood pantothenate.

Pantoyltaurine.—Pantothenate was added in a series of known concentrations to media containing the material to be assayed; the tubes were inoculated as before with *Strep. hæmolyticus*. The effects on growth of different ratios of pantoyltaurine and pantothenate concentrations are known (table I, C) and are affected by blood in a manner which is mainly accounted for by its pantothenate content (table I, D). The pantoyltaurine contents of the specimens were calculated as indicated in table III; the figure constructed from these and other similar results, shows the relation of the pantoyltaurine of rat blood after administration of the drug, to that needed for antistreptococcal action in vitro, and indicates that in vivo activity may be expected.



Ratio of pantoyltaurine to pantothenate in blood of rat after subcutaneous injection of 0·25 g. or 0·05 g. of pantoyltaurine for 100 g. body-weight.

IN VIVO EXPERIMENTS

Pantoyltaurine was used as the 90% pure *d*, *l*-sodium salt prepared by Dr. J. W. Barnett and Mr. F. A. Robinson (1942). A 25% aqueous solution (0·9 *M* with respect to the pure *d*, *l*-compound), which is hypertonic and already a strong buffer at about neutrality, was administered.

Mice.—Experiments were carried out by Prof. H. N. Green in Sheffield University, and by Glaxo Laboratories, Ltd. Mice tolerated the highest doses of pantoyltaurine tested, which were 7 subcutaneous administrations (3 daily) or 5 intraperitoneal administrations (3 daily) of 0·1 g. per 25 g. animal. Professor Green reported as follows: "A preliminary experiment using 0·05 g. pantoyltaurine per 20 g. mouse and a large inoculum showed that the drug was ineffective. The inoculum, from a 24-hour serum broth culture of hæmolytic streptococci (Wamoscher), was therefore reduced to 0·1 ml. of a 10^{-7} dilution, which was about the MLD, and the following groups, each of four mice, were infected intraperitoneally: A, receiving the above dose of pantoyltaurine intraperitoneally 3 times daily, commencing at the time of infection; B, receiving sulphanilamide (10, 10, and 5 mg.) orally; and C, without drug. Group D was not inoculated but received the pantoyltaurine of A. All animals of groups A and C died within 24 hours, but those of B and D survived for 14 days." Pantoyltaurine was thus inactive against streptococci in mice, but it will be noted from table II that the blood-pantothenate of these animals is much higher than that

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TABLE I—EFFECT OF PANTOTHENATE AND PANTOYLTAURINE ON GROWTH OF STREP. HÆMOLYTICUS IN VITRO

	Concentration in medium of		Growth after			
	Pantothenate ($M \times 10^{-8}$)	Other substances	16–20 hr.	24–28 hr.	2 days	4 days
A	0	..	0	0	0	0
	4 to 10,000	..	++++	..	..	..
	2	..	+++	++++	..	..
	1	..	++	+++	+++	+++
	0·5	..	++	++	++	++
	0·2	..	+	+	+	+
	0·1	..	0	0	0	+
B		Rat blood (%)				
	0	0·5	++	+++	+++	+++
	0	0·25	+	++	++	++
	0	0·125	0	+	+	+
	1	0·5	+++	++++	..	..
	0·5	0·25	++	+++	+++	+++
	0·25	0·125	+	++	++	++
C		Pantoyltaurine ($M \times 10^{4}$)				
	500*	2000	0	0	0	+
	500	1000	0	0	+	++++
	500	500	+	++++	..	..
	0·5*	2	0	0	0	0
	0·5	1	0	0	+	++
	0·5	0·5	+	+	++	++
D	10	20 to 1000	0	0	0	0
	10	10	0	0	+	++++
	10	5	+	+++	++++	..
	10	20 + bl. 2%	0	0	+	+++
	10	10 + bl. 2%	+	+	++	++++
	10	5 + bl. 2%	++	++++	..	..

* For intermediate values see McIlwain (1942b). bl. = blood.

of man; the relevance of other differences has not been examined.

Rats.—Treatment with pantoyltaurine was effective in rats (table IV). The experiments were carried out with an organism freshly passaged in rats, and deaths were confirmed as due to streptococci by post-mortem examination. The controls, receiving pantoyltaurine alone, increased normally in weight during the experiment—for example, from 105 to 115 g. in 7 days.

IN VITRO ACTIVITY OF PANTOYLTAURINE AGAINST SULPHONAMIDE-RESISTANT ORGANISMS

Pantoyltaurine was tested in vitro on strains of hæmolytic streptococci against which the sulphonamides had been ineffective. Eleven sulphonamide-resistant strains were obtained from Professor Green, Major A. E. Francis and Dr. C. W. Morley, including several isolated from wound infections (Francis 1942). In each case the organism was found as susceptible to pantoyltaurine as normal streptococci were. The effect of sulphanilamide on resistant and normal organisms was tested in the same medium as was used in pantoyltaurine investigations, and only the resistant strains were found insensitive to the drug. Other evidence of the distinct natures of the sulphonamide and pantoyltaurine receptors, including the production of pantoyltaurine-resistant strains, will be detailed elsewhere.

Various other organisms have previously been examined with respect to pantoyltaurine in vitro. Pneumococci are less inhibited than streptococci. The action on *Corynebacterium diphtheriæ*, though in some cases as great as against streptococci, varies markedly with different strains but not in a manner correlated with normal typing. Staphylococci, *Bacterium coli*, and *Proteus* are not affected. The action of pantoyltaurine was also tested against *Trypanosoma equiperdum*. When given to rats in the doses shown in table IV, it had no effect in preventing the development of infection after intraperitoneal inoculation of a small number of parasites. In addition, Dr. Ann Bishop kindly tested the antimalarial action of pantoyltaurine, by Roehl's method, against *Plasmodium relictum* in canaries. Doses were given on 6 consecutive days at intervals between 9.30 AM and 6 PM, the first dose being given 15 minutes before inoculation with parasitised blood. The dosage on the different days was 3×10 mg.; $10+5+2·5+2·5$ mg.; $4 \times 2·5$ mg.; $4 \times 2·5$ mg.; $2·5+2·5+2·5+5$ mg.; and 2×5 mg., giving a total of 92·5 mg. No antimalarial action was observed under these conditions, which probably do not maintain an adequate blood-concentration throughout the 24 hours.

DISCUSSION

Pantoyltaurine has thus been found to exert an antistreptococcal action in rats at blood levels comparable with those used in the experiments in vitro. The negative results with mice illustrate the caution necessary in the testing of antibacterial agents in laboratory animals. In the present case, the inactivity of pantoyltaurine in mice could be shown to be correlated with their unusually high blood pantothenate (table II), and an animal whose pantothenate level was more akin to that of man was chosen for subsequent work. This is a novel proceeding; usually the concentration of drug antagonists in animals is not investigated. As the antagonists to different classes of drug are different, parallelism in the antistreptococcal action of such drugs in different hosts is not to be expected, and the advantages of in vitro investigation in terms of natural antagonists are evident.

During the experiments in which rats were protected from *Strep. hæmolyticus* by pantoyltaurine, the ratios of the concentrations of drug to those of pantothenate were estimated from the results of table III to be above the level needed for complete bacteriostasis in vitro from comparable inocula for 8 hours daily. The ratios were sufficient for slight antibacterial effect in vitro for 14 hours, while they were below that level for 2 hours. Rats were not protected when the corresponding times were below 2, 16 and 6 hours respectively. The actual concentrations of pantoyltaurine in vitro needed for bacteriostasis in different media can vary over a range of at least a thousand-fold according to the concentrations of pantothenate also present (table III, *c*). Since therapeutic results have been obtained in vivo only if the ratio of pantoyltaurine : pantothenate is as high as that necessary for bacteriostasis in vitro, the action of the drug under the two conditions (in vivo and in vitro) is correlated. Stronger evidence for this correlation is furnished by the inactivation of pantoyltaurine in vivo by simultaneous administration of 1/50th of its quantity of pantothenate, for this is the minimal pantothenate giving relatively prompt reversal of pantoyltaurine effects in vitro. The quantity of pantothenate administered for this purpose is much greater than that assimilable from foodstuffs. The correlation is thus as close as is possible in small animals receiving the drug intermittently. It remains to be established whether the relation between a given degree of bacteriostasis in vitro (in presence of the appropriate natural antagonists) and disinfection in vivo is characteristic of the micro-organisms only, or also of the drug and of the host.

TABLE II—CONCENTRATION OF PANTOTHENATE IN ANIMAL MATERIALS

Specimen	Pantothenate, ($M \times 10^{-7}$)	Specimen	Pantothenate ($M \times 10^{-7}$)
Mouse		*Human*	
plasma	100, 100	plasma	20, 10, 10
blood	200, 200, 100, 200	blood	10–20, 20, 20, 10
Rat			1·4† to 4·5†; mean 2·7†
plasma	20, 20		
blood	20–40, 20, 20, 20–40, 30, 30, 30, 40		9* to 17*; mean 10·3*
urine	50, 100, 100	urine	300, 150, 200
			35† to 240†; mean 116†

* Stanbery et al. 1940.
† Polczar and Porter 1941, the mean value for urine being calculated for a volume of 1500 ml. daily.

The pantothenate levels of the larger animals which have been investigated approximate to those of the rat rather than of the mouse, and the levels in man are lower than those of the rats which were protected in the experiment of table III. Tolerance of pantoyltaurine by animals which themselves need pantothenate may depend on pantothenate reserves, or on different relative affinity or accessibility of pantoyltaurine and pantothenate for systems in the parasite and host which use

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TABLE III—CONCENTRATION OF PANTOYLTAURINE IN RAT BLOOD AND URINE, AFTER SUBCUTANEOUS ADMINISTRATION OF THIS COMPOUND

Specimen taken			Added pantothenate just giving (A) normal growth (B) no growth (ml. of 10^{-5} *M* solution)	Pantoyltaurine present	
—	Hr. after administration	Vol. for assay (ml.)		Calculated (*M* × 10^{-4})	In excess of that needed for inhibition of *Strep. hæm.** (mean)
Blood of rat					
(*a*)	½	0·02	(A) 0·2 to 0·5 (B) 0·05	20 to 50 50	8 fold
(*b*)	1	0·02	(A) 0·05 to 0·1 (B) 0·01	5 to 10 10	2½ fold
(*c*)	1	0·1	(A) 0·1 to 0·2 (B) 0·02	2·5 to 5 8	2 fold
(*d*)	2	0·02	(A) 0·005 to 0·01 (B) 0·001	1 to 1·4† 5†	on inhibitory limit
(*e*)	3	0·1	(A) 0·004	1†	nil
(*f*)	4	0·1	(A) 0·002 to 0·005	0·5† to 0·6†	nil
Urine of rat					
(*d*)	0 to 2	0·002	(A) 1 (B) 0·2	1000 2000	150 fold
(*e*)	0 to 2	0·002	(A) 1 (B) 0·2	1000 2000	150 fold
(*e*)	2 to 4	0·004	(A) 1 (B) 0·1	500 500	25 fold

Dosage: 1·0 ml. of 25% aqueous pantoyltgaurine per 100 g. body-weight; rats weighed 55–70 g. Blood was collected aseptically from animals killed at the times indicated.
* In vitro in presence of the native pantothenate of the specimen.
† Allowance made for native pantothenate in calculating these results.

the growth factor (McIlwain 1942b). Computation of in vivo activity through in vitro experiments with natural antagonists is not itself dependent on bacterial methods of assay of the drug or its antagonists; such methods have been employed here for convenience. Those details of the present methods of correlation which concern the ratios between antagonist and drug concentrations are applicable only to compounds whose relations to their natural antagonists are mainly competitive. A predominantly competitive mechanism has been established for the sulphonamides and for certain pantothenate analogues, including pantoyltaurine; but the method is not rigidly applicable even to such compounds (cf. Clark and Raventos 1937), and it accounts for only their major natural antagonists. In all cases, however, the effect of natural antagonists on drug action can be taken into account quantitatively or qualitatively to a much greater and more precise degree than had hitherto been realised.

The manufacture of pantoyltaurine is relatively easy, though large quantities are required in therapy. It may possibly have practical applications against sulphonamide-resistant streptococci or other organisms. However the present results are described primarily to illustrate a new method for the development of chemotherapeutic agents, and to demonstrate the value of nutritional studies for the understanding and control of their action.

TABLE IV—THERAPEUTIC ACTION OF PANTOYLTAURINE AGAINST HÆMOLYTIC STREPTOCOCCI IN YOUNG RATS

Infection	Treatment	No. of rats alive (days)						
		Start	1	2	3	4	5	6–8
10^{-3}	PT 25%	10	10	10	6	6	6	6
,,	PT 2·5%	5	4	0				
,,	PT 25% plus P. M/50	5	5	1	0			
,,	None	10	8	1	0			
10^{-5}	PT 25%	10	10	10	10	10	9*	9
,,	PT 2·5%	5	5	1	0			
,,	PT 25% plus P. M/50	5	5	4	0			
,,	None	10	10	1	1	1	1	1
10^{-7}	None	3	2	0				
10^{-8}	,,	3	2	1	0			
10^{-9}	,,	3	2	0				
None	PT 25%	2	2	2	2	2	2	2

Infection: by 0·2 ml., intraperitoneally, of the dilutions indicated of a 15-hour culture of the Richards strain, containing about 1200 × 10^6 organisms per ml.
Treatment: 1 ml. per 100 g. body-weight of a 25% or 2·5% solution of pantoyltaurine (PT) given subcutaneously at start, 3, 6, 12, 19, 22, 27, 30, 36, 46, 51, 54, 60, 70, 73, 83, and 96 hours. Rats weighed 60–95 g. P = *d*, *l*-sodium pantothenate, 1 ml. per 100 g. body-weight.
* One rat eaten by mates. Uncertain whether death was due to streptococci.

SUMMARY

Many bacteria need for their growth small amounts of vitamin-like substances, and pathogenic organisms obtain some of these from their host. Pantoyltaurine is a compound which was designed to inhibit growth of bacteria needing pantothenate, a substance of this type, by displacing it from the points at which it interacted with micro-organisms and so in effect starving them of a substance essential for growth. *Strep. hæmolyticus* was particularly sensitive to this action in vitro, and its growth was retarded when the ratio of pantoyltaurine to pantothenate concentrations was above a certain range. Natural materials (e.g., blood and animal extracts) contained little material other than pantothenate which interfered with the action of pantoyltaurine, so that the concentrations at which the drug should starve streptococci of the hosts' pantothenate could be judged from the concentration of that substance in the animal.

Pantoyltaurine was rapidly excreted by rats, but the ratio of pantoyltaurine to pantothenate concentrations in their blood could be kept above the range of in vitro action for most of the day by frequent subcutaneous doses, to which there was no intolerance. Rats so treated for 4 days were protected from approximately 10,000 LD of a virulent strain of streptococcus (Richards), and less completely from 1,000,000 LD. Lower dosage did not afford protection. Similarly mice, whose blood-pantothenate was much higher than those of the rat or of man, were not protected. The validity of this deduction of in vivo action from in vitro experiments was confirmed by artificially raising the blood-pantothenate of rats, when the previously effective dosage of pantoyltaurine became ineffective.

Sulphonamide-resistant streptococci and some strains of *C. diphtheriæ* are sensitive to pantoyltaurine. Since the concentration of pantothenate in human blood is slightly less than that in rat blood, somewhat lower levels would be necessary for therapeutic action in man. Practical applications to human therapy may be possible along these lines, but the main value of this work lies in its description of new methods for the discovery of chemotherapeutic compounds.

We are indebted to those mentioned in the text who have carried out some of the in-vivo experiments and supplied cultures and pantoyltaurine, and also to Miss R. J. Berson, Mr. D. E. Hughes and Miss V. D. Markham for their technical assistance.

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DISPLAY OF POSTURAL AND REMEDIAL EXERCISES.—On March 3 RAF recruits from an air crews reception centre gave a display of these exercises at the Seymour Hall, London, W.1. Recruits who are fit but, according to RAF standards, not fit enough are sent to these centres for three months for a special course to improve their agility, posture and breathing. The exercises at the display were divided into two groups, those for foot defects and those for spinal defects. The meeting was held under the auspices of the Board of Registration of Medical Auxiliaries and Mr. V. Zachary Cope was in the chair.

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DYSPEPSIA IN THE ARMY

L. C. HILL, MD BIRM, MRCP
LIEUT.-COLONEL RAMC; OFFICER IN CHARGE OF THE MEDICAL DIVISION OF A MILITARY HOSPITAL

To present yet another series of Service dyspepsias shows the continued importance of the problem in the wards and outpatient departments of military hospitals. Today, no less than two years ago, the dyspeptic soldier and his disposal looms largely in the outlook of unit medical officers, medical specialists and medical boards. It might have been assumed that a greater appreciation of the importance of the problem by the civilian boards would have reduced the intake of potential dyspeptics, but the figures hardly warrant this assumption.

The present series of 197 dyspeptic patients (18 officers and 179 other ranks) represents about 17·5% of the total medical admissions between November, 1941, and May, 1942. These figures are not claimed to represent the picture as a whole, being only those cases which the outpatient physician thought merited further investigation. It has not been the policy, in this hospital, except where history and examination strongly suggested organic dyspepsia, to investigate cases in which symptoms developed within the first few weeks of training and could be attributed to slow adjustment to the new conditions of life, the heavier food and the changed conditions of consuming it. Nor were those with a short unconvincing history investigated. This is in accordance with Tidy's (1941) suggestion. It has been necessary under conditions where the outpatient work is out of all proportion to the beds available to limit all unnecessary admissions to hospital. Cases in which the history was typical, where there was no epigastric tenderness or guarding, and where a general clinical impression pointed to a functional diagnosis, have been returned to unit with suggestions to patient and medical officer on the appropriate lines (teeth, diet, smoking and rest). Inquiry has shown that a considerable proportion of these men carry on satisfactorily. Deliberate malingering is rare, as most observers will agree, but it is difficult to draw a fine distinction between exaggeration of symptoms and mild neurosis.

I do not propose to compare and discuss in detail the various figures of organic and non-organic dyspepsias which have appeared since the beginning of the war, since this has been done by others. The differences have been variously explained as being the result of method of selection, variability in diagnostic criteria, gradual alterations in the age-groups, and an increasing realisation on the part of the civilian boards of the importance of the problem.

In spite of some degree of selection, I have diagnosed peptic ulcer less often than most other observers and the percentage of gastric ulcers is relatively high. Functional dyspepsia was diagnosed in 40·6% of the cases, and 70% of these showed completely normal findings. With the limited apparatus available it has not been possible to estimate the incidence of a true gastritis in this group, but from clinical observation and from the subsequent behaviour of these patients it is difficult to accept as universal the high percentage described by Morton Gill (1942) and others. On the other hand, the common accompaniments of tremor of the hands, mild tachycardia, dyspnœa and precordial pain on exertion (often in the 30–40 age-group) suggests a picture resembling effort syndrome. The rapid swallowing of a heavy meal after a spell of physical exercise by a man whose life has hitherto been sedentary, at a time when his circulation is mainly "in his boots," is a possible explanation of one way in which dyspeptic symptoms can begin. Slow adjustment to Army life on the part of the solitary person, domestic and financial worries, are all too frequent to be lightly dismissed. The proportion of true psychoneurotics is relatively high (6·1%) and approaches Saffley's (1941) figures.

DIAGNOSIS

The main question to be answered is whether there is an ulcer present or not, and since no authoritative criteria have been laid down for the diagnosis, the personal factor must influence each observer's figures. It seems reasonable to assume that the main cause of differences of percentages lies in variability of diagnostic criteria, particularly radiological, which are often vaguely described. Most cases in this series were first seen in the outpatient clinic, where a careful history was taken and an examination made. No facilities existed for further investigation at this stage, and if this was considered necessary the man was admitted immediately or was put on the gastric waiting-list. Occasionally a history of perforation or previous gastro-enterostomy, with its appropriate scar, justified an immediate diagnosis.

On admission the investigation followed conventional lines. A fractional test-meal was carried out lasting 3 hours; and after careful preparation on a milk diet for at least 3 days, a benzidine test was done on the stools. The test-meal was repeated in most cases with abnormal acid results, and after an injection of histamine in all cases of achlorhydria. Barium series included, in addition to screening, X-ray examination in the anteroposterior, lateral and two oblique planes. No tilting table or special apparatus for compressing the cap was available, but this was carried out manually. The final diagnosis was made in each case on the information gained from all sources.

Peptic ulcer.—The criteria required are essentially radiological and consist in the demonstration of a persistent niche. In every case of gastric and pyloric, and in most of the duodenal ulcers (see table), such a niche was demonstrated. In a small percentage of the duodenal group (less than 20%) the diagnosis was based on a combination of a persistent deformity, tenderness or fixation of the duodenal cap and hyperchlorhydria with a climbing or plateau curve. It was strengthened by the presence of a positive benzidine test.

Duodenitis.—In the absence of adequate means of demonstrating abnormal states of the duodenal rugæ, the differences between duodenal ulcer and duodenitis are not particularly clearcut, and no definite pathological evidence of the existence of duodenitis has yet been produced to support Cordiner's (1942) views. The main criteria are radiological, but there are other factors in history and in response to diet and treatment which are at least suggestive. The history differs only in the absence of that periodicity with long remissions which Morton Gill (1942) has rightly pointed out as a feature of duodenal ulcer. Symptoms consist of pain in the epigastrium (with tenderness and guarding in the right upper rectus area) coming on 1½–3 hours after meals and relieved temporarily by alkalis and by food. Vomiting is very rare and the appetite is good. Fats are taken less well than in duodenal ulcer. The test-meal results are virtually identical, but in duodenitis there may be mucus in the resting juice. The typical radiological appearances comprise the so-called "irritable cap" consisting of spasms of the muscularis, incomplete filling and very rapid dispersal of contents. Such caps if seen at all are small, hazy in outline and spiky.

Functional dyspepsia.—The radiological findings in this group vary within wide limits of functional normality. Thus the hypermotile, rapid emptying, high-placed stomach of the high-acid type contrasts with the atonic, low-lying, poorly motile, low-acid type in which the appearance of early pylorospasm represents an achalasia of the pylorus through which the meal can easily be pushed. The nearer the approach to achlorhydria and chronic gastritis, the more likely is a rapid rate of emptying to be due to a patent pylorus. Apart from occasional help from the radiologist the diagnosis of high-acid type depends on a history similar to, but less severe than, duodenal ulcer, with heartburn and "waterbrash." The diagnosis was not made unless the free acid level in the test-meal was constantly above 60% after an hour. The incidence of gastritis in this big group was difficult to assess, but, except in the low-acid types, it was thought to be small. Clinical features suggesting gastritis are pain immediately after food, often with vomiting which relieves; the vomit contains mucus. Constipation is virtually constant and so is a dirty tongue. Alkalis and food do not relieve during an attack. Fatty foods are particularly difficult to digest.

Miscellaneous.—Achlorhydria was diagnosed only after the test-meal had been repeated, and if there was a normal blood-picture and sedimentation-rate and a negative benzidine test.

Of the 10 cases included as symptomatic of psychoneurosis, 7 showed all the stigmata of anxiety neurosis

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with or without adequate ground for anxiety. In 2 the condition appeared to result from insufficient convalescence from infective illness. The remaining 3 exhibited, among other signs, hysterical vomiting and air-swallowing.

Of the dyspepsias secondary to other conditions, 2 were apparently due to chronic pulmonary tuberculosis, discovered accidentally during screening, 2 more were associated with spastic constipation, and 1 with doubtful cholecystitis. No example of appendicular dyspepsia was encountered and I have still to meet one.

DISCUSSION

Dyspepsia figures in the Services have been reviewed by previous writers, and no fundamental differences or new facts are evident from consideration of the present series, which accords most closely with Hutchinson's (1941).

It will be seen from the table that of the 86 ulcer cases symptoms began in civilian life in 53 (78%) compared with 15 (22%) in the Army, and of these 15, 5 were regular soldiers. Virtually the same tendency is seen in

ANALYSIS OF 197 CASES OF DYSPEPSIA IN 18 OFFICERS AND 179 OTHER RANKS

Diagnosis	Cases and %	Age	Av. age at onset	Av. duration of symptoms	Cases of onset in—	
					Civil life	Army
		(yrs.)	(yrs.)	(yrs.)		
Peptic ulcer	68					
Duodenal	47 (24·0)	29·5	23·5	6	35	12
Gastric	12 (6·1)	32·5	26	6·5	11	1
Pyloric	9 (4·5)	30·5	26	4·5	7	2
Duodenitis	15 (7·6)	32	26·5	5·5	11	4
Functional dyspepsia	80					
Hyperchlorhydria	8 (4·0)	28·5	25·5	3	4	4
Hypochlorhydria	16 (8·0)	34	31	3	10	6
Normal acidity	56 (28·5)	29·5	27·5	2	24	32
Achlorhydria	7 (3·5)	35·5	27	8·5	5	2
Chronic gastritis	7 (3·5)	44	35	9	6	1
Referred dyspepsia	5 (2·5)	30	27·5	2·5	5	..
Duodenal ileus	2 (1·0)	25	23	2	2	..
Duodenal diverticulum	1 (0·5)	41	40	1	..	1
Psychoneurosis	12 (6·1)	32·5	30	2·5	6	6
Averages	..	31·2	26·8	4·4	..	..
Totals	197(100·0	..	..	..	126	71

duodenitis. The average duration of symptoms is about 6 years. Compared with other series, the percentage of ulcers diagnosed is low. This may be due to more exact radiological criteria and to the separation of duodenitis into a special group. From the point of view of disposal, such a separation is more interesting than important, since the diagnosis is not recognised in *Nomenclature of Diseases* and since removal of these cases from the Service is as necessary as that of duodenal ulcer cases. The differential diagnosis, as mentioned above, rests mainly on the radiological appearances, but may also be suspected from the history and from the presence of mucus in the specimens during the test-meal, though this may admittedly indicate a gastro-duodenitis. The condition is often more difficult to treat than ulcer and the patients require at least as long a period of strict dieting followed by a permanently limited regime if relapse is to be avoided.

Of the cases investigated, 80 (40%) proved to be functional, and of these 24 showed a gastric acidity outside the normal limits as their only abnormality. When these are added to the number of dyspeptics treated at their unit by competent medical officers and those sent up for specialist opinion in whom investigation for one reason or another was not proceeded with, the resulting figure is very high. The factors responsible for the high incidence of dyspepsia as compared with that met with in civil life or in the last war, when diseases of the digestive system (dysentery apart) came low on the list, are those connected with the functional group and must be mainly psychological. They include boredom from the protracted period of training and the dispersal of men largely urban in their tastes to areas where recreation of the type to which they have become accustomed is not to be had, where they suffer anxiety about their wives and families in bombed areas or about children in reception areas, and irritation induced by comparing their own pay with the high wages of munition workers and imported labourers working for contractors on Army sites. In the last war men were more quickly drafted away to find themselves in the thick of fighting or under novel conditions of every kind. The importance of the psychological background of both organic and inorganic dyspepsia is emphasised by the astonishing rise in the incidence of such complications as severe hæmorrhage and perforation during the period of heavy air-raids. As might be expected, in more than half symptoms originated during Army service and the duration of symptoms was found to be much shorter than in the ulcer and duodenitis groups.

It has not been possible to estimate the incidence of gastritis, but it may be suspected in cases with a long history and when, in spite of reassurance and such simple modifications of diet as are possible under Service conditions, the patient repeatedly breaks down. The percentage is probably highest among the low-acid group. On the whole there was nothing to suggest from a follow-up (necessarily short) that the incidence is anything like so high as that suggested by Morton Gill and others. A considerable proportion of these functional dyspeptics with a normal acidity appeared to fall under the heading of "effort dyspepsia," with features analogous to those of effort syndrome. Dental sepsis was present in several. All the cases of chronic gastritis had hypochlorhydria, with mucus in excess in all specimens, a long history (average 9 years); in 2, the cause seemed to be alcohol; the average age was high.

A surprisingly high number of achlorhydrics were discovered (7) in whom all other investigations were negative. The older men in whom anorexia and loss of weight pointed to the possibility of neoplasm were boarded out and put under civilian hospital supervision. The remainder improved with dilute hydrochloric acid and regrading.

There is still no uniformity with regard to the disposal of the dyspeptic soldier. Early in the war attempts were made to return the men suffering from ulcer to their units after a course of treatment, with the result that they became a nuisance and drifted from one hospital to another until they were invalided out. In this hospital all cases of proved ulcer and those diagnosed as duodenitis have been boarded out of the Army and arrangements have been made for their treatment outside. An exception has been made in the case of a few officers and senior NCOs in key positions, who were given a full course of treatment and placed in category C. The psychoneurotics were all referred to the psychiatrist and most of them were boarded out of the Army, either immediately or after institutional treatment. As a group they seemed particularly resistant to treatment of any kind. All cases of chronic gastritis were similarly disposed of, and 2 cases of achlorhydria for the reasons mentioned above.

The functional dyspeptics were dealt with on their merits. The decision to board out of the Army, regrade into a lower category, or return to unit without regrading, depending on such factors as the length of history, severity of symptoms, and result of the fractional test-meal. The hypochlorhydric type were particularly resistant to treatment and liable to relapse, and they and the high-acid group were all either regraded and put into a lower category, usually C, or invalided out of the Army. Of the remainder, most were returned to unit after being firmly reassured in a special interview in which every effort was made to remedy any obvious faults or failure to adjust. A few remained slightly disgruntled, but all were made to realise that they had a full investigation and a square deal, and the majority went out prepared to make a fresh start, with every prospect of success.

In view of the psychological basis in many cases, it was considered important to carry through the whole course of treatment and come to a decision with regard to disposal as rapidly as possible. Nothing is more demoralising to the functional dyspeptic than to allow him to languish unnecessarily in hospital. Repeated investigations should be avoided at all costs, which is a very good reason why the first one should be complete and decisive; and hedging about the diagnosis should be avoided as far as possible in writing to the MO. The segregation of dyspeptics into special wards was found to be extremely detrimental, and any advantages which may derive from

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the employment of a specially trained staff are far outweighed by the disadvantages. The man who develops functional dyspepsia, especially of the "effort stomach" type, is impressionable. Symptoms spread and increase in severity and the sight of proved ulcer patients being boarded out of the Army makes the successful return of functional cases to duty enormously more difficult.

SUMMARY

The results of a full investigation of 197 dyspeptics at a static military hospital, over a period of 7 months, have been tabulated and discussed.

The incidence of peptic ulceration was somewhat lower than that found by most observers. There was no evidence to suggest that Army conditions adversely affect organic dyspepsia.

The separation of a duodenitis group has been attempted.

Among the functional dyspeptics, patients showing features analogous to those seen in effort syndrome are labelled "effort dyspepsia."

The disposal of dyspeptic patients, the disadvantages of their segregation in hospital, and the importance of a rapid and businesslike investigation, are set out.

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VITAMIN-C INTAKES AT A RESIDENTIAL HOME

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IN war-time the intake of vitamin C during the winter and spring is liable to fall below the 30 mg. per day recommended by the Technical Commission of the League of Nations (1938). Although many people seem habitually to take less than this amount without any obvious effect on their health, it must not be too lightly assumed that the absence of signs or symptoms implies ideal nutrition or that the recommendation of the experts concerning the desirable intake can be ignored. Indeed, recent trials have proved that some groups of children or adolescents in apparently normal health benefited from an increased allowance of vitamin C, their average physique or resistance to infection, for example, being significantly better than the controls on the ordinary diet (e.g., *Bull. War Med.* 1941, Glazebrook and Thomson 1942). Information about the vitamin-C status of the British population as influenced by the war is somewhat meagre, and the work to be described was undertaken with two main objectives in view. First, we desired to determine the daily consumptions of vitamin C at different seasons of the year at a typical well-conducted institution, and to ascertain which common foodstuffs furnished the more important supplies of the vitamin in actual domestic practice. Secondly, we wished to obtain data for use in an accurate standardisation of the saturation test for vitamin C, comparing responses to test doses at various graded levels of intake (Harris 1943).

Material.—The investigation was made at Cambridge at a home for waifs and strays where about 36 boys are in residence, of ages between 8 and 14. A daily record was kept of the diet sheet, of the methods used for cooking, and of the sizes of the helpings given per day. Where necessary, allowances were made for absentees, illness, or other similar irregularities.

Methods.—At frequent intervals specimens of the dishes as served were analysed for vitamin C by rapid titration of an acid extract against 2,6-dichlorophenol-indophenol [Birch, Harris and Ray's (1933) micro-adaptation of the method of Harris and Ray (1933), with details of procedure as described by Harris and Olliver (1942) and Harris, Mapson and Wang (1942)]. It was unnecessary to analyse many of the foods, such as bread, cereals, fish and meat, because their vitamin-C content is zero or negligible. The significant contributions to the anti-scorbutic activity were furnished almost exclusively by the potatoes and green vegetables, and to a less extent by other root crops, fruit when in season, and jam. Moreover experience proved that the repeated analysis of the same dish day after day was unnecessary. Provided account was taken of seasonal changes in the activity of the raw material (particularly of the difference between new and old potatoes) and of variations produced by alterations in the method of cooking and the time of cooking, or by the delay between cooking and serving, it was found sufficiently accurate to calculate the vitamin-C content from the experimental result obtained under the same circumstances on previous occasions.

Indeed, since the exact conditions of cooking and preparation of the food were accurately known and standardised, it was found possible without serious loss of accuracy to base the calculation on the use of tables giving the average content of vitamin C in fruits and vegetables as consumed (Olliver 1943). These tables are derived from the results of several thousand estimations over the past seven years. Although individual specimens of a cooked or raw food may vary greatly in their vitamin-C contents, the average values in the tables are based on such large numbers of specimens taken from so many sources that errors due to random variations become relatively small when the tables are used to calculate the vitamin-C intake of a dietary over a period.

TABLE I—COMPARISON OF ASCORBIC ACID FOUND CHEMICALLY AND PREDICTED FROM TABLES

Typical day in—	Food portion (oz.)		Ascorbic acid in ration of food consumed (mg.)		Ascorbic acid predicted as percentage of found
			Found	Predicted	
January	Swedes	1	3	3	
	Carrots	3	3	3	
	Potato	10	10	14	
	Jam (blackberry)	1	1	1	
	Total		17	21	124
March	Potato	7	4	4	
	Carrots	3	3	3	
	Jam (blackberry)	1	1	1	
	Sprouts	6	44	44	
	Sprout water	4	21	16	
	Total		73	68	93
July	Carrots	3	6	6	
	Potato	8	5	2	
	Stewed apple (canned)	4	2	5	
	Jam (gooseberry and strawberry)	1	4	3	
	Total		17	16	94
Early November	Potato	7	12	22	
	Cabbage	5	30	26	
	Cabbage water	4	14	12	
	Stewed apple	9	5	9	
	Jam (strawberry)	1	1	3	
	Total		62	72	116

TABLE II—AVERAGE AMOUNT OF ASCORBIC ACID IN COOKED POTATOES AT DIFFERENT SEASONS

Month	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March and onward
Ascorbic acid (mg. per 100 g.)	10*	16*	12	9	7	5	3	2

* Freshly dug potatoes.

Table I illustrates the good agreement between the daily intake of vitamin C as found chemically and as calculated from the tables. The difference on any day was rarely more than 20%, and reckoned over a period was considerably less.

Factors influencing the vitamin-C content of raw and cooked foods as consumed.—With uncooked fruits and vegetables, differences between varieties and in the degree of maturity is of little practical consequence, but the degree of freshness of stored vegetables is an important factor (see table II for potatoes). With cooked fruits and vegetables the activity

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varies somewhat according to whether steaming, baking, frying or boiling is used. In cooking by boiling the most important source of loss is extraction of the vitamin into the cooking water and this increases with the amount of water used. Also the loss is greater when the water to which the vegetable has been added is brought slowly to the boil in the pan, or when the vegetable is kept hot after cooking and before serving (table III). Mashed potatoes, for example, may be greatly inferior to boiled if there is delay in serving. Similarly allowances have to be made in calculating the vitamin C in frozen foods, dried fruits and vegetables, fruit and vegetable juices, and jams.

TABLE III—ASCORBIC ACID IN COOKED CABBAGE KEPT HOT BEFORE SERVING

Min. kept hot	0	15	30	45	60	75	90
Per cent. ascorbic acid destroyed	0	25	40	50	60	70	75

Daily intakes of vitamin C; seasonal variations.—Specimens from the day-to-day records are reproduced in table IV, to indicate how the 24-hour totals were arrived at and to illustrate the contributions made by various typical foods at different times of the year. The

TABLE IV—EXTRACTS FROM DAILY RECORDS—INTAKE OF VITAMIN C FROM VARIOUS SOURCES

Date	Ascorbic acid (mg.) derived from: Carrots	Cabbage*	Potatoes	Other vegetables*	Lettuce	Jam	Fruit	Total
1941								
Aug. 11	3	..	7	Beetroot 2	..	..	..	12
Aug. 12	5	..	7	Onion 1	..	1	..	14
Aug. 13	..	..	..	Beetroot 2	10	1	..	13
Aug. 14	1	..	8	Onion 1	..	..	..	10
Aug. 15	3	..	8	Onion 1	..	1	..	13
Aug. 16	..	25 (+ 12)	7	..	10	..	Stewed apple .. 10 Raw apple .. 8	72
Aug. 17	..	25 (+ 12)	7	..	..	1	Stewed rhubarb 4 Raw apple .. 8	57
Total for week	12	50 (+ 24)	44	7	20	4	30	191
Daily average	..	..	..	..	..	..	..	27
Aug. 18	2	..	30 †	Onion 1	..	..	Stewed blackberries 12	45
Aug. 19	2	..	30	..	10	1	..	43
Aug. 20	1	..	35	Onion 1	10	1	..	48
Aug. 21	4	..	30	..	..	..	..	34
Aug. 22	4	..	30	..	10	..	Raw apple .. 6	50
Aug. 23	..	..	30	..	..	..	..	30
Aug. 24	..	25 (+ 12)	30	..	..	2	Stewed apple .. 12	81
Total for week	13	25 (+ 12)	215	2	30	4	30	331
Daily average	..	..	..	..	..	..	..	47
1942								
Mar. 15	..	..	6	Parsnip 3	..	..	..	9
Mar. 16	3	..	5	Parsnip .. .. 2 Onion 1	..	2	..	13
Mar. 17	..	..	6	Parsnip .. .. 3 Watercress .. 51	..	..	..	60
Mar. 18	..	..	6	Beetroot 1	..	..	..	7
Mar. 19	3	..	..	Parsnip .. .. 2 Beetroot 1	..	1	..	7
Mar. 20	..	..	6	Parsnip 3	..	6	..	15
Mar. 21	3	..	6	..	..	1	Canned apple .. 5	15
Total for week	9	..	35	67	..	10	5	126
Daily average	..	..	..	..	..	..	..	18
Mar. 22	..	..	4	Sprouts .. 42 (+ 16)	..	..	..	62
Mar. 23	3	..	4	..	..	3	..	10
Mar. 24	..	..	4	Beetroot 2	..	2	..	8
Mar. 25	..	..	4	Beetroot 2	..	2	..	8
Mar. 26	..	..	4	Onion 1	..	1	..	6
Mar. 27	3	..	4	Parsnip .. .. 3 Swedes 7	..	3	..	20
Mar. 28	..	..	4	Parsnip 3	..	1	..	8
Total for week	6	..	28	60 (+ 16)	..	12	..	122
Daily average	..	..	..	..	..	..	..	17
Aug. 2	..	..	30 ‡	Spinach 32	..	..	Stewed rhubarb .. 9	71
Aug. 3	..	..	32	Raw onion .. 9	9	..	..	50
Aug. 4	..	..	33	..	9	2	..	44
Aug. 5	..	..	32	..	9	2	Stewed rhubarb .. 9	52
Aug. 6	2	..	33	Onion 2	..	2	..	39
Aug. 7	..	26 (+ 12)	32	..	..	..	Stewed apple .. 9	79
Aug. 8	3	..	30	..	..	..	..	33
Total for week	5	26 (+ 12)	222	43	27	6	27	368
Daily average	..	..	..	..	..	..	..	53
Sept. 27	..	26 (+ 12)	22	..	..	..	Tomatoes .. 18	78
Sept. 28	6 (raw)	..	22	Raw beetroot .. 4	..	..	Tomatoes .. 30 Raw apple .. 9 Raw pear .. 6	77
Sept. 29	2	..	22	Onion .. .. 1 Turnip 8	..	2	Raw apple .. 9	44
Sept. 30	6 (raw)	..	22	Raw beetroot .. 4	..	..	Stewed apple .. 9 Tomatoes .. 30	71
Oct. 1	6 (raw)	26 (+ 12)	22	Raw beetroot .. 4	..	..	Tomatoes .. 18 Stewed apple .. 9	97
Oct. 2	..	..	22	Onion 1	..	..	Cooked tomatoes 12 Raw pear .. 3	38
Oct. 3	2	..	..	Onion .. .. 1 Turnip 8	..	..	Raw pear .. 4	15
Total for week	22	52 (+ 24)	132	31	..	2	157	420
Daily average	..	..	..	..	..	..	..	60

* Values in parentheses are for cooking water, used for preparation of gravy, &c. † New potatoes begun. ‡ New potatoes.

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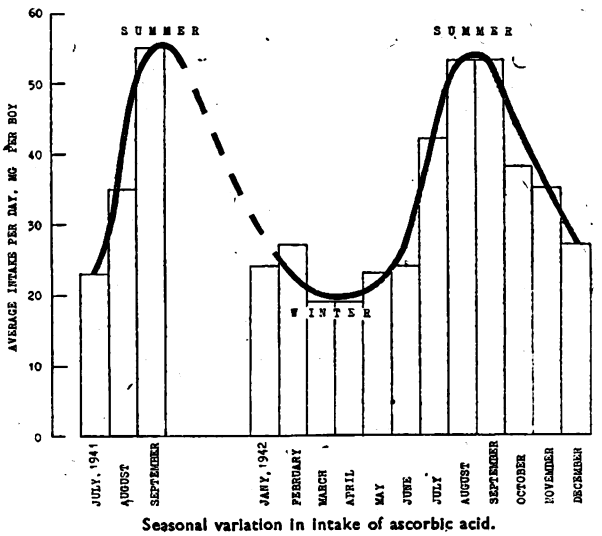
final summaries are in table V. The figure shows graphically how the intake of vitamin C varies with the season, rising to a maximum in late summer and then gradually falling again during the autumn and winter, dropping to its lowest ebb around March and April. A study of the detailed records reveals that the principal cause of the higher intake of the vitamin in the summer is the change from old to new potatoes in late August (1941) or late July (1942). This alone may account for an addition of as much as 30 mg. per day. The other notable cause of the higher values in summer was the increased consumption of home-grown garden produce (including cabbage, cauliflower and spinach).

Sources of vitamin C.—The most important carrier of vitamin C in the diet was the potatoes, and to a lesser extent green vegetables (especially cabbage and sprouts). The value of the potato resides in the large amounts of it regularly consumed: green vegetables are certainly richer in vitamin C, per unit of weight, but are not generally served so often or in such quantities and at all seasons. It would be well if the consumption of greenstuffs could be still further encouraged. For example, if Brussels sprouts and sprouting broccoli, cooked by approved methods (see above), were taken 3 or 4 times weekly during the winter the intake of the vitamin would thereby be brought nearer, or equal to, the usual summer level. However, the fact remains that—whether from reasons of economy, convenience, custom or palatability—greens are not used to the extent which is to be desired. In these circumstances it is difficult to see how in war-time a diet can be devised supplying the LoN requirement of vitamin C, during the greater part of the year, except by a liberal provision of potatoes. It should also be remarked that at the institution where our tests were made, the water in which the vegetables had been cooked was utilised at the same meal for making gravies and in other ways. The value of this practice is substantiated, for our analyses confirmed that the cooking water provided an appreciable fraction of the total intake of vitamin C. Another point worth mentioning is that vegetables served raw as salad, although richer than cooked vegetables in vitamin C per unit of dry weight, are in fact less effective as antiscorbutics, since the amount that can be consumed per helping is considerably less, and they are also probably less effectively digested and the vitamin C less completely absorbed from them.

TABLE V—INTAKE OF ASCORBIC ACID PER BOY PER DAY

Week ending	Ascorbic acid* Range	Ascorbic acid* Average	Week ending	Ascorbic acid* Range	Ascorbic acid* Average
1941			May 2	11–42	19
July 5	5–30	16	May 9	4–51	18
July 12	7–49	15	May 16	5–50	24
July 19	18–52	35 (*a*)	May 23	4–43	20
July 26	10–44	24	May 30	4–56	31 (*e*)
Aug. 2	4–56	23	June 6	6–49	23
Aug. 9	6–47	20	June 13	6–46	23
Aug. 16	10–72	27	June 20	3–46	19
Aug. 23	30–81	47 (*b*)	June 27	8–59	32 (*f*)
Aug. 30	2–56	44	July 4	7–89	39 (*g*)
Sept. 6	41–79	57	July 11	7–44	21
Sept. 13	11–81	47	July 18	4–65	39 (*h*)
Sept. 20	27–81	49	July 25	31–117	61 (*i*)
Sept. 27	21–105	66 (*c*)	Aug. 1	38–82	50
No records Sept. 28 to Dec. 27, 1941			Aug. 8	33–71	53
			Aug. 15	35–71	49
			Aug. 22	18–80	53
			Aug. 29	37–77	57
			Sept. 5	36–72	52
			Sept. 12	22–76	48
1942			Sept. 19	4–67	46
Jan. 3	4–55	17	Sept. 26	43–78	57 (*j*)
Jan. 10	6–43	19	Oct. 3	15–97	60 (*k*)
Jan. 17	9–55	24	Oct. 10	27–60	39
Jan. 24	9–76	37 (*d*)	Oct. 17	24–67	43
Jan. 31	5–69	22	Oct. 24	23–66	38
Feb. 7	9–76	32 (*d*)	Oct. 31	24–43	33
Feb. 14	8–102	28	Nov. 7	22–81	38
Feb. 21	8–78	28	Nov. 14	5–72	32
Feb. 28	7–66	20	Nov. 21	13–74	39
Mar. 7	2–95	23	Nov. 28	24–42	30
Mar. 14	7–65	19	Dec. 5	18–73	30
Mar. 21	7–60	18	Dec. 12	19–33	23
Mar. 28	6–62	17	Dec. 19	20–29	24
April 4	9–66	21	Dec. 26	21–100	38
April 11	8–92	24	Dec. 31 (5 days)	13–28	19
April 18	7–42	15			
April 25	5–66	18			

(*a*), extra cabbage; (*b*), new potatoes started; (*c*), raw cabbage; (*d*), extra sprouts; (*e*), spinach, cauliflower and raw orange; (*f*), extra cabbage, stewed gooseberries; (*g*), extra cabbage, raw strawberries, stewed gooseberries, peas; (*h*), new potatoes from mid-week; (*i*), raw gooseberries; (*j*), extra tomato, apple, blackberries; (*k*), extra tomato, apple. * mg. per day.



Seasonal variation in intake of ascorbic acid.

COMMENTS

Our findings indicate that a good domestic management which had paid attention to such desiderata as a plentiful supply of potatoes, the provision of greens and garden produce when in season, and the culinary use of vegetable cooking-water was able to furnish a diet not seriously below the LoN requirement during the greater part of the winter or spring, even in war-time, and to exceed it considerably during the summer and autumn. This seasonal variation in the level of nutriture is brought out clearly by the results of saturation tests. After the winter the boys took from 2 to 3 days to approach saturation and after the summer only 1 day. The supply of vitamin C is certainly far less satisfactory in the average poor working-class household, and the difference is again confirmed by saturation tests, a typical war-time winter value being 4 days (cf. Harris 1942, 1943).

SUMMARY

Analyses were made on representative specimens of the various cooked and raw foods served at a boys' residential home and the results used to calculate each day's total intake, over a period of 12 weeks in the summer of 1941 and for the full 12 months of 1942. From time to time complete meals were analysed as a further check on the calculated values, and the agreement was good, the average "predicted" result being 110% of the average "determined" result.

A pronounced seasonal variation was noted, the average daily intakes in mg. being as follows. In 1941: July, 23; August, 35; September, 55. In 1942: January, 24; February, 27; March, 19; April, 19; May, 23; June, 24; July, 42; August, 53; September, 53; October, 38; November, 35; December, 27. This difference between the intakes in summer and winter was reflected in the results of saturation tests (first day response in all instances after summer, as compared with second to third day response in all instances after winter). The change from old to new potatoes in late July (1942) or late August (1941) was responsible for an addition of about 30 mg. per day. The other notable cause of the higher values in the summer was the increased use of garden produce, such as cabbage, cauliflower, spinach and some fruits.

Apart from potatoes, important because of their regular use and the relatively large amounts consumed, the principal source of vitamin C throughout the year was the green vegetables, such as cabbages and sprouts. The desirability of an increased intake of greenstuffs during the winter is emphasised. Cooked vegetables had an advantage over raw in that much larger quantities could be eaten and assimilated. The water in which the vegetables had been cooked was utilised for preparing gravies, &c., and also furnished an important supply of vitamin C.

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In this institution dietary practice was particularly good, with the result that the vitamin-C intakes and levels of nutrition, as determined by saturation tests, were considerably higher than those typical of poor working-class homes.

We wish to thank Mr. J. W. Palmer for his coöperation in the labour of sampling and tabulating the menus.

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JAUNDICE IN SYPHILITICS UNDER TREATMENT

POSSIBLE TRANSMISSION OF A VIRUS

JOSEPH W. BIGGER, M D, SC D DUBL, F R C P I, M R C P
LIEUT.-COLONEL RAMC

THE most probable cause of jaundice following inoculation of human blood, plasma or serum, is the transfer of a virus from the donor to the recipient. It has been suggested that the higher incidence of jaundice in recent years in syphilitic patients undergoing arsenical treatment is due, in whole or part, to the same or a similar virus.

Consideration of the virus hypothesis and some experience of the dangerous potentialities of syringes used for multiple inoculations led me to investigate the technique used in hospital VD departments.

In one such department, a sterile 10 c.cm. 'Record'-type syringe was filled with neoarsphenamine solution, prepared with sterile water in a sterile gallipot, and the needle was introduced into a vein. To ensure that the solution was injected intravenously, a small amount of blood, estimated at 0·2 c.cm., was drawn into the syringe. The solution was then injected. A small amount, estimated at 0·3 c.cm., was allowed to remain in the syringe to obviate the supposed danger of the air bubble, which is usually present, being injected. When the needle was withdrawn from the vein, it was removed from the syringe into which was drawn sterile water from a gallipot to the capacity of the syringe, estimated at 13 c.cm. This was ejected completely and the syringe was similarly washed out a further four times—once with sterile water, once with 1 : 1000 biniodide solution, and twice with sterile water. After the preparation described the syringe was fitted with a sterile needle and another injection was given. Although two syringes were available, the same one might be, and often was, used for ten or more consecutive treatments without boiling. There were only three gallipots in use, two with water and one with biniodide solution. One of the gallipots with water was used for the washings which preceded the biniodide solution and the other for the subsequent washings. The gallipots were replenished when necessary with sterile water or biniodide solution but were not boiled until three or four injections had been given. Each needle was boiled after use.

It is understood that a similar method of preparing syringes is in use in many other VD departments, while in some the washings are much more perfunctory. It was at once obvious that this technique might permit a minute amount of the blood of one patient to be injected into the vein of another.

RISK OF TRANSMITTING INFECTION

In order to study the possibility of living micro-organisms being transferred in this way, the following experiment was performed.

Into a syringe containing neoarsphenamine solution (0·6 g. in 10 c.cm. of sterile water) about 0·2 c.cm. of citrated human blood, heavily contaminated with staphylococci, was introduced and all but about 0·3 c.cm. of the mixture was rejected. The needle was removed and the syringe was washed in the same manner as described above with two quantities of sterile water, one of 1 : 1000 biniodide solution and a further two of sterile water, a separate sterile gallipot being used for each washing. A sterile needle was fitted and 10 c.cm. of sterile water was aspirated. Of this, 5, 2, 2, and 1 c.cm. were injected into blood-culture bottles. After incubation, each bottle was found to contain staphylococci.

Seven somewhat similar experiments were carried out, but in these the number of washings in water was increased and that in biniodide was omitted since the preliminary experiment had shown that, as was to be expected, it had not been effective in killing the staphylococci carried over with the blood. In these experiments, 1 c.cm. of each washing, except the first, was plated in agar and hence the number of living staphylococci in each was estimated. Culture of the first washing was omitted, since it was presumed that even the most casual medical officer would wash out the syringe at least once. The table gives the number of staphylococci per c.cm. in the blood used and in the washings.

STAPHYLOCOCCI PER C.CM.

	Experiment—						
	1	2	3	4	5	6	7
In blood (millions) ..	1·4	1·4	1·4	3·2	1·1	3·1	6·7
In washing no. 2 ..	27	9	93	58	1600	51	340
In washing no. 3 ..	10	4	10	40	1000	3	110
In washing no. 4 ..	10	49	0	5	500	0	95
In washing no. 5 ..	7	11	1	13	200	0	190
In washing no. 6 ..	5	6	2	4	160	0	28

It is a simple matter to calculate what the counts would be if a washing represented a simple dilution of the amount remaining from the previous wash. If the blood used contained 3,000,000 bacteria per c.cm., the first washing should contain 1800 per c.cm., the second 14 and the third and subsequent washings 0.

The experimental results depart widely from the calculated values mainly because the piston cannot fit so tightly in the barrel as to scrape its wall completely free of the fluid previously contained in it. Some of this fluid lies between the piston and the barrel, some collects in the groove of the piston and, if the piston fits loosely, some passes the piston and collects on its remote end. Each washing does not dilute merely the 0·1 c.cm. remaining in the nozzle with 13 c.cm. of water but adds to it also the amount wetting the portion of the barrel exposed when the piston is fully withdrawn. At any washing a minute trace of much more heavily contaminated fluid from a remote filling of the syringe may be transferred from the groove or the remote end of the piston to the barrel and thence to the washing water. This explains the examples of a late washing showing a higher count than an early one. The rate of fall should be rapid when syringes with tight-fitting pistons are used and slow when the pistons fit loosely. The syringes used in experiments 3, 4, and 6 were noted as good, in experiment 2 as moderately good, and in experiments 1, 5, and 7 as bad.

If the technique already described as used in a VD department was followed, the sixth washing would correspond to the fluid injected into a second patient. On theoretical grounds, the cocci present in the blood of the first patient should have been diluted to such an extent as to cease to represent a danger to the second patient. But in only one of the seven experiments were cocci absent from 1 c.cm. of the fluid prepared for injection.

DISCUSSION

The experiments were planned to ascertain if the technique of preparing syringes for intravenous therapy in VD departments could be relied upon to prevent the transfer of living organisms from the blood-stream of one patient to that of another. They show that the precautions taken are not adequate to guard against this risk, although it must be stated that the blood used was contaminated to an extent never likely to be encountered in patients. The practice referred to of using the same vessels for washing syringes several times increases the risk; and so, to a much greater extent, would the reduction of the number of washings below the five represented in the experiments.

We are not yet certain if jaundice in syphilitic patients undergoing arsenical treatment is due to a virus. If it

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is, it is probable that the virus is present in the blood-stream as is the hypothetical virus responsible for jaundice following the administration of transfusions, measles and mumps antisera and yellow-fever vaccine. It is known that a very small amount of human serum introduced with yellow-fever vaccine can give rise to jaundice. Until our knowledge is more complete, it would be wise to regard the blood of a patient undergoing arsenical treatment as dangerous and to guard against its introduction into the blood-stream of another human being, even in high dilution.

I have not attempted to prove that jaundice has actually been transmitted in the way suggested, but even the remote possibility that it may be deserves serious consideration. The recent increase in jaundice in the clients of VD departments is consistent with the hypothesis that a virus present in the blood of a very few persons has been widely disseminated by the activities of these departments. In the department the methods of which were studied the incidence of jaundice in patients undergoing antisyphilitic treatment increased from 4·2% in 1941 to 16·5% in 1942. It would greatly prejudice the campaign against venereal disease if it were the fate of all syphilitics to develop jaundice as the result of their treatment, but if the hypothesis is correct this will be the ultimate result unless the methods used are improved.

The transfer of blood might carry with it other living organisms: malaria parasites were so transferred in several cases when salvarsan was administered by the old gravity method.

It is easy to point to the danger but much less easy to suggest practicable methods of avoiding it. The most reliable one is to use a freshly boiled syringe for each patient. If all-glass syringes are used, a battery of three or four would be ample, but with syringes of Record-type a much larger number would be required in departments administering many treatments owing to the necessity of gradual heating and a long cooling time if breakages are not to be excessive. Thorough washing of dismantled syringes in water followed by soaking in a powerful disinfectant and then by further washing in water is suggested as an alternative to boiling, but with much less confidence.

A boilable bulb might be interposed between the needle and the syringe; the blood would flow into the bulb but would not pass to the syringe. This method should obviate the danger, but does not inspire the same confidence as does the boiling of the actual syringe.

SUMMARY

It has been suggested that jaundice in syphilitics receiving intravenous arsenicals may be due to transmission of a virus from patient to patient.

Technique in a VD clinic was investigated. It was customary to use the same syringe, fitted with a succession of sterile needles, for 10 or more consecutive treatments. After each injection the syringe was washed thoroughly with sterile water and 1 : 1000 biniodide, five washings in all. It was presumed that this would remove the few drops of blood drawn into the syringe at the beginning of each injection.

Experiment showed that the washings were not sufficient to remove all living organisms from the syringe, when these were present in the blood. A virus might thus pass from patient to patient in clinics where the same or similar techniques are used.

The use of a freshly boiled syringe for each patient is the most certain way of preventing this risk.

". . . Everyone nowadays has heard about nutrition, about the folly of men starving in the midst of plenty. But few people realise that underconsumption of drugs by the world is equally grievous. Effective drugs are costly. And to put it bluntly, the great mass of mankind is starved of essential drugs. So there are two urgent needs. Increased production of known drugs. Increased exploitation of the technique for discovering new drugs."

From a broadcast talk by Prof. L. J. WITTS.

IMPERIAL CHEMICAL (Pharmaceuticals) Ltd. now describe their 'Avlon' brand of sulphamethazine as 'Sulphamezathine' brand of sulphadimethylpyrimidine.

EFFECT OF COUMARIN AND DICOUMARIN DERIVATIVES ON PROTHROMBIN LEVEL

JÖRGEN LEHMANN, M D

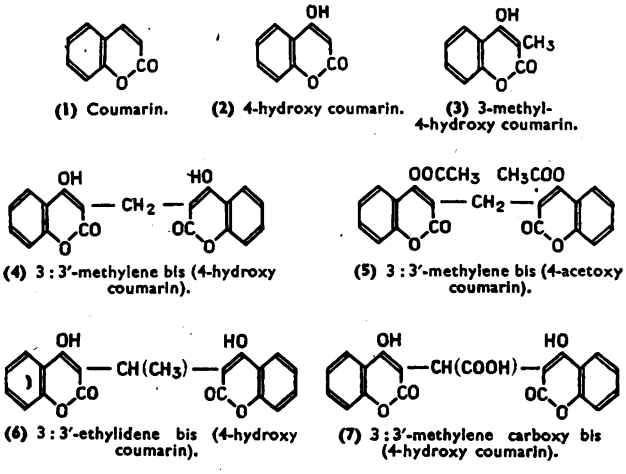
CHIEF OF THE CENTRAL LABORATORY OF THE SAHLGRENSKA HOSPITAL, GOTHENBURG, SWEDEN

IN previous papers[1,2] I presented data on the prothrombin depressing effect in animals and man of a dicoumarin, 3 : 3′-methylene bis (4-hydroxy coumarin), first isolated from spoiled sweet clover hay and synthesised by American investigators,[3] who also first produced hypoprothrombinæmia in animals with this substance. I introduced the dicoumarin in the therapy of thrombosis and described 17 cases in most of which definite benefit was demonstrated. Up to the present over 60 cases of thrombosis have been treated and the compound has been given as a preventive of post-operative thrombosis in about 100 patients. American investigators are also interested in the therapeutic use of the substance; a personal communication from Dr. Allen and Dr. Barker of the Mayo Clinic mentions that they have treated a similar number of patients.

Parallel with the clinical work I made experiments with derivatives of the simple coumarin molecule to see if any antiprothrombin action could be demonstrated; to find the active groups in the 3 : 3′-methylene bis (4-hydroxy coumarin) molecule; and to investigate the possibilities of finding a water-soluble stable derivative of the dicoumarin for intravenous injection and eventually to find other active dicoumarin compounds.

The substances tested were kindly synthesised by the Ferrosan Co. of Malmö, Sweden. Rabbits on ordinary diet were used as test animals and the prothrombin was determined by my modification[4] of Quick's method. The prothrombin level was expressed in Quick's index

Key to the 7 different compounds investigated



(1) Coumarin. (2) 4-hydroxy coumarin. (3) 3-methyl-4-hydroxy coumarin.

(4) 3 : 3′-methylene bis (4-hydroxy coumarin). (5) 3 : 3′-methylene bis (4-acetoxy coumarin).

(6) 3 : 3′-ethylidene bis (4-hydroxy coumarin). (7) 3 : 3′-methylene carboxy bis (4-hydroxy coumarin).

units. The substance to be tested was given by mouth in increasing doses to the same rabbit. After every dose the prothrombin was allowed to return to normal (index 90–110), and after 2–4 days a fresh dose was given. To compare the activity of the different substances a unit for their antiprothrombin activity was chosen. This is defined as the amount of the substance, expressed in mg. and given by mouth to rabbits of 2 kg. body-weight, which depresses the index from 100 to 50 ± 10; this antiprothrombin unit is denoted by AP. Such a unit is open to criticism from several points of view, such as different sensibility of the animals, and the hyperbolic index scale, but it serves as a preliminary, very rough basis for comparison.

COUMARIN AND COUMARIN DERIVATIVES

(1) *Coumarin.*—Fig. 1 shows the action of coumarin on the prothrombin level; 1 AP unit = 2000 mg. The result was rather irregular in different rabbits. Some of the rabbits died from this dose and most of them when it was increased to 2500 mg.

(2) *4-hydroxy coumarin.*—The introduction of a hydroxy group in position 4 increased the antipro-

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thrombin activity of the coumarin about four times (fig. 2). Here 1 AP unit = 500 mg.

(3) *3-methyl-4-hydroxy coumarin.*—This compound is of special interest, as its constitution is very similar to that of vitamin K, which is 3-methyl-1·4-naphthoquinone. Accordingly it might be expected that the substance would be able to interfere with vitamin K in the hypothetical enzyme complex of the liver, in which vitamin K is active in producing prothrombin (competitive inhibition, see Lehmann[2]). But fig. 3 shows that the substance does not depress the prothrombin level more than 4-hydroxy coumarin; 1 AP unit = 500 mg.

Further substitution in the coumarin molecule was without interest.

THE DICOUMARIN AND SOME DERIVATIVES

(1) *3:3′-methylene bis (4-hydroxy coumarin).*—In fig. 4 is seen a typical result with this substance; 1 AP unit = 2–4 mg. I have not found any rabbit resistant to the substance, as American investigators have done.

(2) *3:3′-methylene bis (4-aceloxy coumarin).*—Substitution in the two 4-hydroxy groups was tried with several acids. Phosphorylation and sulphonation was, by analogy with synthetic vitamin K, expected to give water-soluble substances, but these substitutions have not as yet been successfully performed. Acetylation was easily performed, but the substance was not water-soluble. The activity of this compound is seen in fig. 5; 1 AP unit = 4 mg., about the same as for the unsubstituted 3:3′-methylene bis (4-hydroxy coumarin). It differs however from that substance in two respects: the hypoprothrombinæmia persists considerably longer, 4–7 days compared with 1–2 days for the 3:3′-methylene bis (4-hydroxy coumarin) before it suddenly rises towards normal index values; the toxicity is increased about ten times, for the lethal dose was about 50 mg., compared with 500 mg. for 3:3′-methylene bis (4-hydroxy coumarin). Severe lesions were found in the liver and the kidneys. These properties prohibit its clinical use.

(3) *3:3′-ethylidene bis (4-hydroxy coumarin).*—The substitution of the methylene bridge by an ethylene bridge between the two coumarin molecules gave a substance of about the same activity as that of the substance with the methylene bridge. The shape of the prothrombin curve, the toxicity and the solubility were similar to those of the original dicoumarin derivative. Fig. 6 shows the prothrombin curve.

(4) *3:3′-methylene carboxy bis (4-hydroxy coumarin).*—The introduction of a carboxy group in the methylene bridge gave a substance whose sodium salt was water-soluble to 25%, but this substance showed little activity when given intravenously. A somewhat greater activity was found when it was administered by mouth. As seen in fig. 7, 1 AP unit = 150–300 mg. The substance was not active enough to be of interest.

CONCLUSION

The compounds investigated showed no advantages over the original 3:3′-methylene bis (4-hydroxy coumarin), and an active stable water-soluble substance for intravenous injection was not found.

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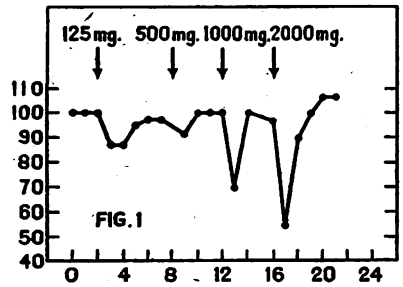
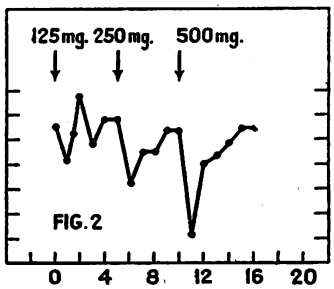
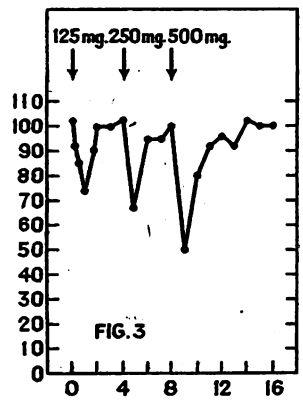
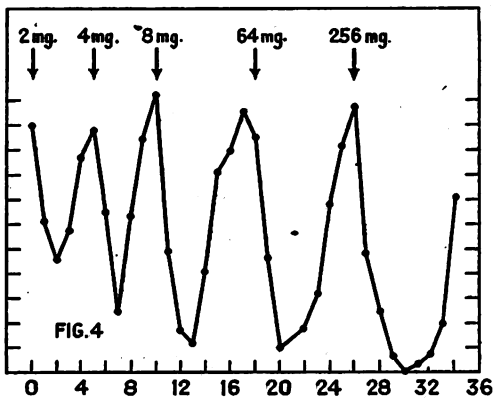
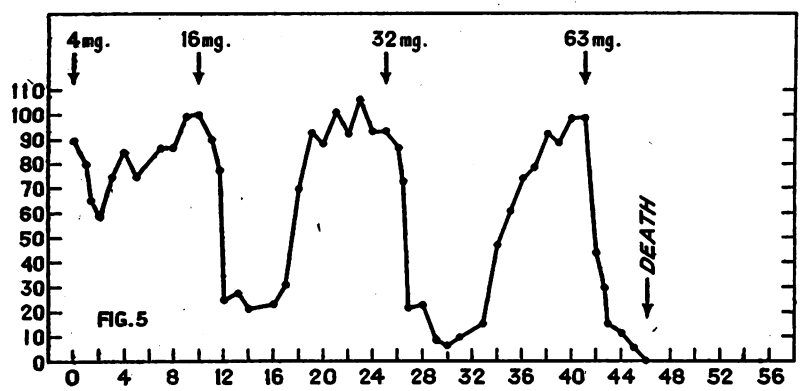
EFFECTS OF COUMARIN, DICOUMARIN AND SOME DERIVATIVES ON PROTHROMBIN LEVELS

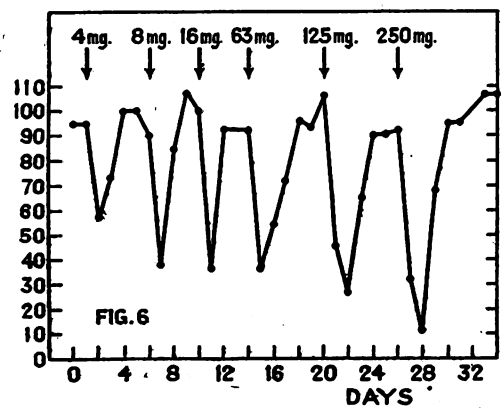


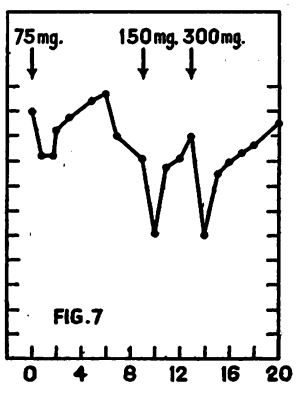












The Norwegian fishing experimental station in Bergen is trying to make large quantities of insulin from fish. It has been proved that the cod has in its gall-bladder a type of insulin which is of the same quality as the known types. If it is possible to find a practicable method to extract this the fishing in the Lofoten alone will deliver more insulin than the whole of Norway needs.—*Hamburger Fremdenblatt*, Dec. 12, 1942.

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STRICTURE OF SMALL BOWEL FOLLOWING STRANGULATED HERNIA

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A CONTINUOUS gradation of pathological changes may follow strangulation of a loop of bowel in a hernial sac, ranging from perforation of a patch of gangrene to changes so slight that there appears to be complete recovery. The damage varies with the time for which the strangulation is allowed to persist, the tightness of the neck of the sac, and the circulatory resilience of the particular patient's vascular tree. Owing to venous obstruction and œdema, and often progressive intestinal obstruction, the strangulation tends to become tighter and tighter.

In an uncommon group of cases, a stricture, physiological or organic, supervenes. Three examples of this condition were recently reported by Barry.[1]

The term " physiological stricture " is far from ideal, but is here used to describe an interference with the peristaltic wave as it reaches the recent site of strangulation. As a result of ischæmia there is a more or less temporary interference with the neuromuscular mechanism, causing obstruction to the passage of intestinal contents. A similar temporary obstruction may follow end-to-end anastomosis of bowel. The organic stricture usually takes longer to develop. After irreparable damage to some muscular fibres, or in some cases as a sequel to partial vascular thrombosis, a progressive fibrous narrowing of the lumen takes place. This may affect a very small segment of bowel or may extend for many inches. I have seen a similar condition follow localised mesenteric vascular occlusion, without strangulation by any constricting agent. The symptoms are those of progressive intermittent small bowel obstruction, or of paralytic ileus. As in carcinoma of the small gut, the stricture may be very narrow before the severity of the symptoms suggests the need for laparotomy. When an organic stricture is present lateral anastomosis gives excellent results. The clinical course can be best understood from the following 3 illustrative cases, seen in a personal series of 185 strangulated hernias.

CASE-RECORDS

CASE 1.—A woman, aged 62, operated on for strangulated right femoral hernia on Dec. 23, 1940. Progressed well for some days, but after a week complained of mild attacks of colic and distension. There was increased audible peristalsis. These symptoms gradually subsided and she was discharged. Returned to hospital a month later with similar symptoms and signs, but again settled down and was sent home. Three months after original operation, she returned to hospital with definite subacute small-bowel obstruction. Laparotomy on March 21, 1941. Narrow stricture of the ileum, ½ in. long, with hypertrophy and distension of the bowel proximally. Lateral anastomosis was performed, with uneventful convalescence.

CASE 2.—A woman, aged 70, operated on for strangulated right femoral hernia on Nov. 17, 1941. Clinical course closely simulated previous case, but a little slower. Laparotomy on June 11, 1942. Subacute small-bowel obstruction due to narrowing of the lumen over a length of 6 in. Uninterrupted recovery followed lateral anastomosis.

CASE 3.—A man, aged 36, operated on for strangulated right inguinal hernia on May 25, 1942. After 3 days complained of severe abdominal colic and vomiting of dark fluid. Stomach was aspirated continuously and an intravenous saline instituted. Much increased audible peristalsis, so it did not appear probable that there had been a delayed perforation with peritonitis. Condition slowly deteriorated and pulse-rate rose to 130 per min. Although peristalsis continued and a little flatus was passed, the stomach contents remained dark and there was moderate distension. On May 30 abdomen was opened under local anæsthesia, through a right lower rectus-splitting incision. Bowel proximal to the site of previous strangulation was distended and undergoing active peristalsis. The waves of peristalsis stopped abruptly at this segment, and although there was very little narrowing of the lumen the distal bowel was considerably collapsed ; peritoneum was healthy. Obstruction seemed to be due to a physiological upset, so abdomen was closed and previous treatment resumed. Patient made a slow but steady recovery, although some slight distension and increased audible peristalsis persisted for about 3 weeks.

In all these cases the bowel appeared to be viable at the time of the first operation. The mortality of resection of gut for strangulation is so high that when there is only a slight doubt as to its viability the wisest course is to return the loop to the abdomen. I have never had a case of delayed perforation, and an occasional post-operative stricture is not enough to make me alter my allegiance to this rule.

SUMMARY

Postoperative stricture has been seen 3 times in a personal series of 185 strangulated hernias.

Two varieties of stricture may follow strangulated hernia—a rapidly developing " physiological " obstruction to peristaltic waves reaching the site of strangulation, and a more slowly developing fibrous stricture.

The possibility of this complication is not enough to justify indiscriminate resection of bowel.

My thanks are due to Mr. J. Hamilton Barclay for the opportunity of treating these cases in his wards.

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Medical Societies

SOCIETY OF MOHs

AT a meeting of the fever hospital medical service group of the Society of Medical Officers of Health on Jan. 29, with Dr. ANDREW TOPPING in the chair, a discussion on

Sulphonamide Therapy

was opened by Dr. B. BARLING (LCC) who pointed out that hundreds of preparations of the sulphonamide group of drugs had now been synthesised but only some 6 were in common use in this country. An effective blood-concentration of 3–15 mg. per 100 c.cm. depended on (*a*) regular intake of the drug and (*b*) the output of urine. During treatment sulphonamide was found in all normal tissues except fat and compact bone, and in all normal and pathological body fluids. Most drugs in the group passed into the cerebrospinal fluid, some more readily than others. In discussing the mode of action of the sulphonamides, he said that their bacteriostatic action could be blocked by *p*-aminobenzoic acid or substances chemically allied thereto, including a number of local anæsthetics in common use. In this way sulphonamide might be rendered virtually inert. Large-scale experiments in gonococcal cases showed that sulphonamide resistance could appear as (*a*) an absolute resistance, (*b*) a relative resistance or (*c*) an acquired resistance due to the use of too small a dose. This last, he felt, was a real danger which was not new to chemotherapy ; it already had been encountered often in the specific treatment of trypanosomiasis. Dosage, therefore, must be adequate and he suggested 1 g. of sulphonamide for every 20 lb. of body-weight in an adult ; this amount to be multiplied by two in the case of children and by four in infants. The total amount thus obtained should be divided so as to administer the drug at regular 4-hourly intervals throughout the twenty-four hours. Given adequate dosage, the next important step was to select a preparation of the drug to which the infecting organism was known to be sensitive. If no obvious response was obtained it was quite wrong to persist with the drug for longer than 7–10 days. Another common fault was to attempt sulphonamide therapy of deep abscesses or infected wounds without preliminary surgical treatment.

Dr. THOMAS ANDERSON (Glasgow) said that though the value of chemotherapy in pneumonia has been proved, pneumococcal pneumonias generally showed considerable variation in severity and mortality when treated with sulphonamides, depending on the serological type involved. He noted that results of chemotherapy in Glasgow, where the commonest type of pneumococcus is type 2, had been much less impressive than in the South of England where the more benign type 1 infection is prevalent. The results in type 3 infections vary principally with the age of patient. During 1939–40 and in the early part of 1941, type 3 cases

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predominated among the older age-groups and carried a high fatality-rate. Since then, among younger persons, type 3 cases have been much milder. He considered age to be of increasing importance in assessing results obtained by chemotherapy in pneumonia. Taking type 2 infections alone, he had found that the fatality-rate in people under 40 had fallen as a result of chemotherapy from 22% to 4%, whereas in the older age-groups the fall was from 46% to 25%. Further, an analysis of 69 consecutive pneumonia deaths in patients given chemotherapy showed that 81% were people over 40. Bacteræmia is another important factor in determining the outcome of an attack of pneumonia and he thinks there is some reason for believing that the risk of bacteræmia increases with age. The relative failure of chemotherapy in those over 40 with bacteræmia is more probably due to the impoverished defences of the host—a state which permits bacteræmia—than to the presence of the organism itself in the blood-stream. One of the most disturbing features about pneumonia cases treated by chemotherapy he found is the prolongation of convalescence by delayed resolution. This again is commoner in those over 40 and in those with bacteræmia, and is also appeared attributable to lack of tissue resistance. Generally he felt that the introduction of the sulphonamide group of drugs has not removed pneumonia from that group of diseases which require intensive study. He was not convinced that better results could be obtained in the bad-risks groups by increasing the dose of the drug, and said there was no evidence that the drug was less well absorbed by persons in the older age-groups. He had found that combined treatment with chemotherapy and serotherapy, using type-specific serum, produced no better results, as judged by fatality and delayed resolution, than chemotherapy alone; nor did vaccines as an adjuvant appear to influence the course of the disease. The sulphonamides are effective against a wide variety of organism, and he suggested that their lack of specificity argued in favour of the view that they act principally by rendering the organism more susceptible to the natural defences of the host; that being so, tissue resistance is a more important factor in promoting recovery from, and resolution of, pneumonia than the presence of specific antibodies or neutralising substances.

Dr. H. STANLEY BANKS (LCC) considered sulphathiazole the drug of first choice for meningococcal infections. Comparing 200 cases treated with sulphapyridine with 300 treated with sulphathiazole he had found the latter drug apparently more potent and much better tolerated; its use, or alternatively sulphadiazine, made all the difference to the comfort of the patients. Supplies of sulphathiazole have recently improved and are soon likely to be generally available. The cost at present is about double that of sulphapyridine but, with increasing demand, should soon be reduced. He thought sulphadiazine was the drug of second choice, but at present it is very expensive and has to be imported. As a practical compromise until supplies are normal, he suggested that all but the most severe cases could be treated with one or the other of these drugs for the first three or four days and the course completed with sulphanilamide. He finds a standard of dosage based on body-weight to be fallacious if applied to all ages. Infants excrete the drugs rapidly and require 2–3 times the adult standard in proportion to body-weight. No infant, he considers, should be given less ahan 3 g. daily during the first two days of treatment, for adults during this period 9 g. daily is an appropriate dose and for children an intermediate amount according to age. The mortality of meningococcal infections had been greatly reduced by chemotherapy. In 1940 and 1941 about 20% of notified cases died, compared with about 60% in pre-sulphonamide years. Judging by certain large series of hospital cases in which the case-fatality rate was as low as 6–8%, he thought that the mortality of this disease in the country generally could be still further improved. The chief types in which a high fatality-rate was unavoidable, he said, were those with: adrenal involvement; encephalitis; or ordinary meningitis undiagnosed and untreated till a late stage. Age should be only a secondary factor in fatality. Quite low fatality-rates in infancy and over the age of 45 years have been achieved.

Dr. WILLIAM GUNN (LCC) classified acute gastro-intestinal disorders into 3 categories: those due to enteral causes due to specific organisms; those due to parenteral causes in which the intestinal upset is due to a focus elsewhere, often the upper respiratory tract; and those in which the causation is unknown, commonly called acute gastro-enteritis or infective enteritis, though numerous other designations have been employed at different times. Routine use of highly enriched or selective media (desoxycholate citrate agar for the dysentery-salmonella group and Wilson-Blair media and tetrathionate broth for the enteric group) and the taking of rectal swabs as well as fæces have greatly improved diagnosis in the last few years. The employment of sulphaguanidine (3 g. thrice daily for 3 days and twice daily for 4 days, making a total of 51 g. in 7 days) in 23 cases of Flexner dysentery resulted in more rapid clinical recovery (diarrhœa 2·6 days against 5·8 days) and elimination of organism (6·8 days compared with 15·1 days) than was seen in a similar number of controls observed at the same time. No such beneficial effect was observed among 7 cases of salmonella (Thompson) food-poisoning and 7 carriers compared with controls. The total admissions of acute gastro-enteritis to a fever hospital during 1942 were analysed; the case-fatality of unselected cases was 20·3% but in the severe group accompanied by dehydration it rose to about 50%; of 22 severe cases treated with succinyl sulphathiazole or sulphasuxidine (supplied from the Medical Research Council) 12 died—a total case-fatality of 45·5%. The treatment is believed to reduce or eliminate coliform organisms, and thus allow earlier oral administration of sugar than is possible without the drug, but the verdict must for the present remain one of not proven.

Dr. ROBERT SWYER (LCC) recorded the results of an experiment carried out with sulphanilamide and sulphapyridine during the 1940–41 measles epidemic. One or other of the preparations was administered, for a period of 4 days after admission, to 324 children suffering from measles. A further 869 children were observed as controls. No significant effect could be demonstrated either on the initial phase of the measles attack or on the incidence of complications. He felt, therefore, that the indiscriminate use of these rather toxic drugs could not be justified prophylactically in measles. Used therapeutically for certain complications, the results were better; the complications most likely to benefit being those due to streptococci or pneumococci, particularly bronchopneumonia. The fatality-rate among measles-pneumonia cases treated with sulphonamides was 11·2% as compared with a 30% mortality in a pre-sulphonamide epidemic. The results of chemotherapy in established measles otorrhœa were less satisfactory, but he felt that his series was too small for any definite conclusion to be drawn. There was a danger, he thought, in using sulphonamides in the early stage of otitis media, unless the patient was under expert and continuous observation, since the symptoms of onset of mastoiditis could be masked thereby.

ASSOCIATION OF CLINICAL PATHOLOGISTS

AT its meeting on Jan. 22–23 the association gave much attention to the aid which sternal puncture may afford when the clinical findings and ordinary blood examinations do not point to a clear diagnosis. Dr. S. C. Dyke described two misleading cases. In a woman of 21, the blood picture—30,000 white cells, 98% of mononuclear type—indicated leukæmia; a positive Paul-Bunnell reaction, however, and the appearance of the bone-marrow, established a diagnosis of infective mononucleosis. In a man of 65, the white count of 2800, nearly all mononuclears, suggested aleukæmic lymphatic leukæmia, but peroxidase stain and the bone-marrow clearly showed myeloid leukæmia. Dr. Elizabeth Delikat demonstrated films from these two cases. Dr. F. Pick showed films of blood and sternal marrow from monocytic leukæmia. Dr. E. N. Allott described the case of a woman with Raynaud's disease whose serum contained agglutinins active at 37° C. against group O corpuscles. Quantitative absorption experiments suggested that, in addition to the abnormal agglutinin in the serum, there was also a deficiency of the ordinary group O antigen in the corpuscles.

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In the discussion that followed the paper by Dr. A. S. Watts on laboratory aids in the diagnosis of pulmonary tuberculosis some fallacies in the patch test were pointed out—the possibility of degeneration of the patch material and hence the greater accuracy of the Mantoux test; the necessity of thorough cleansing of fat from the skin with ether or acetone before the application of the patch; and the lack of response in skin tanned by sun and wind. Speakers stressed the need for examination of a 24-hour collection of sputum by a concentration method if early morning specimens failed to give the diagnosis. For concentration, some laboratories preferred the "antiformin," others the "soda" technique. It was agreed that by neutralising the soda deposit the final material adhered satisfactorily to the slide. Dorset egg medium should be included, for the exclusive use of media incorporating glycerin would result in a disproportionate selective isolation of bacilli of human type. Dr. H. G. Close showed cultures of saprophytic acid-fast bacilli which had grown in 30 of 1900 specimens (1·6%) of sputa inoculated on Löwenstein media. They were characteristic in that 2–4 weeks elapsed before the colonies became visible on primary isolation; on subcultivation they grew within a few days at room temperature. All his strains were of the pigmented, smooth, easily emulsifiable type, and were non-pathogenic to guineapigs.

In a survey covering one year, Dr. F. A. Knott gave details of recurrent epidemics of pemphigus among the babies in a maternity ward, and of staphylococcus infection among the mothers. The many cultures of *Staphylococcus aureus* were (according to general biochemical activity rather than in any one reaction) arbitrarily divided into three grades, A, B and C. A was the most vigorous in hæmolysin, coagulase and pigment production, and in fermentation of carbohydrates. Numerous cultures from nose, hands, skin, vagina, breasts and mouth enabled the infected children to be identified, as well as the carriers presumably responsible for the outbreaks. Grade A strains predominated in fluid from unbroken bullæ. Exclusion from the wards of all mothers, children and nurses yielding grade A staphylococcus effectively controlled the outbreaks. Grades B and C appeared to play a minor part, if any, in causation. Grade A strains were rarely if ever found in the dust or environment, and seemed to be transmitted from person to person. It appeared that infants' noses became infected from carriers on the staff, and then infected the mothers' breasts during suckling. Dr. E. H. Gillespie pointed out that staphylococcal typing was the only reliable method for identifying strains responsible for epidemic infection. Techniques which depended on the rate of antibody absorption, even if they helped in distinguishing potentially pathogenic staphylococci, would lead to false incrimination of carriers. From the ensuing discussion it was clear that some maternity hospitals are not yet alive to the urgent danger of direct spread of infection from mastitis, pemphigus and the like in the staphylococcal nursery.

Reviews of Books

Surgical Diseases of the Spinal Cord, Membranes and Nerve Roots

CHARLES A. ELSBERG, MD, emeritus professor of neurological surgery, College of Physicians and Surgeons, Columbia University, New York. London: H. K. Lewis. Pp. 598. 80*s*.

THIS impressive monograph is the epitome of Dr. Elsberg's long experience of spinal cord surgery. He established his reputation as a specialist in this field twenty-six years ago, with the publication of *Diseases of the Spinal Cord*; nine years later came *Tumours of the Spinal Cord* which has remained the standard work on the subject since then. The present volume is in many respects a revision and elaboration of its predecessors. The whole field is covered: there are chapters on congenital abnormalities, spinal injuries, inflammatory lesions, tumours, vascular abnormalities, and descriptions of operations for the relief of pain and involuntary movements. As a record of Dr. Elsberg's own experience, it is natural that some conditions should be described more fully than others. Thus tumours of the cord receive the greatest emphasis, and the intervertebral disc lesion (which came into prominence later) is not so comprehensively described. The chapters on radiology by Cornelius Dyke, and on pathology by Abner Wolf are full of information. On the whole surgeons will be more satisfied than neurologists. The clinical descriptions are adequate, but could have been improved by references to other monographs (such as that of Symonds and Meadows on high cervical tumours). Nevertheless, there is no doubt that this will remain the standard work for many years to come.

Medical Diseases of War

(3rd ed.) Sir ARTHUR HURST, DM Oxfd, FRCP, consulting physician to Guy's Hospital. London: Edward Arnold. Pp. 495. 21*s*.

Sir Arthur Hurst has brought his book, originally published in 1916, up to date in this third edition. He gives to it not only his own experience on active service in the last war, and his special gift of clear writing, but has also secured contributions from a small team of experts. There are new chapters on diphtheria and on typhus; the latter bears the stamp of Dr. Melville Mackenzie's profound experience and makes one regret the absence of any comment on the problems of preventive vaccination. Other additions include the sulphaguanidine treatment of bacillary dysentery, new methods of isolation of dysentery and enteric organisms, infective jaundice and cerebral concussion. Nearly half the book is given up to war neuroses and functional disorders, of which Hurst saw much at the Seale Hayne Hospital in the last war. Medical officers especially will benefit from these chapters since even now psychoneurosis is often still regarded as either malingering or a mistaken diagnosis covering some unrecognised organic disease. Some wider references to true malingering would be helpful, and the question of criminal responsibility in such cases as desertion, absence without leave and the like might have been discussed in relation to fitness of the patient to undergo trial. The medical officer would, we think, have been glad to hear about the evidence likely to be required of him. The chapter by the late T. A. Ross on anxiety neurosis is unchanged.

Dr. H. W. Barber contributes a sound account of scabies, pediculosis, the seborrhœic state, and impetigo contagiosa. Advice on tinea infections, so widespread in the tropics, would be a useful substitute for the account of dermatology in the BEF in France at the beginning of the war. The illustrations are good and there is a discerning sense of proportion about the whole book.

X-Ray Atlas of Silicosis

(2nd ed.) A. J. AMOR, MD Lond. Bristol: John Wright and Sons. Pp. 206. 30*s*.

THIS atlas, as we noted on its first appearance two years ago, is a fine achievement, of special value to industrial medical officers. A portion of the first edition of this atlas was unfortunately destroyed by enemy action, but this has given Dr. Amor an opportunity to incorporate a short résumé of the recent survey of South Wales coal-miners by D'Arcy Hart and Aslett. Apart from this the volume is unaltered. The 30 introductory pages on the pathology, diagnosis, and prognosis of silicosis are first class. The 62 plates have been carefully chosen and are a good selection, representative of the disease as seen in different industries in this country. Not all the reproductions are perfect (war conditions have been the difficulty), the defects not being of much consequence in the advanced cases with typical nodulation and consolidation; but in the early plates illustrating increased linear striation and reticulation, the loss of definition makes it less easy to follow—which is a pity, for these early X-ray appearances, although not associated with symptoms, help to decide whether a worker should continue in a hazardous industry or not. The book emphasises the need for a standard radiographic technique in the investigation of industrial lung diseases. This can be achieved by the use of four-valve units with fine focus rotating anode tubes. Until such apparatus is available the confusion in regard to normal and abnormal striation will increase.

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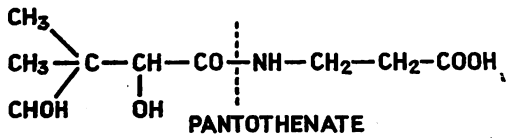
THE LANCET

LONDON: SATURDAY, APRIL 10, 1943

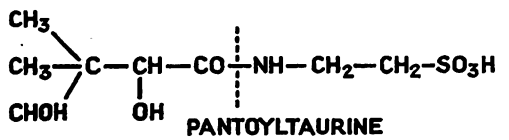
ANTIBACTERIAL STRATEGY

MANY important discoveries are the result of an accident which the genius of an investigator has turned to good account. The discovery of penicillin by FLEMING is an example, and in a different way the sulphonamides owe their being to a series of such accidents. The Germans tried prontosil in the hope that here would be just another antiseptic dyestuff with a greater affinity for bacteria; by chance they were opening up a new and priceless field in the treatment of disease. In looking for coal they had stumbled on a gold mine. They put the sulphonamide group into their dyes to make them stain better; the therapeutic activity of prontosil however was due, not to its staining properties, but to the happy chance that the human body could reduce azo dyes—the reduction product had a fatal attraction for bacteria which preferred it to their proper food. And still the luck held. Prontosil is so weakly active that it would have been pronounced inactive against almost any other organism than the hæmolytic streptococci against which it was tested. Time has gone by and other, more potent drugs have replaced prontosil and sulphanilamide. These have been produced by the routine work of chemists highly skilled at complicated substitutions. The products were tested and the results sifted until out of hundreds of compounds sulphapyridine, sulphathizaole and sulphadiazine have emerged as the most useful.

In our opening page MCILWAIN and HAWKING describe possibly the first case of successful chemotherapy in which every step had been planned beforehand. Pantoyltaurine is not a sulphanilamide or a penicillin from the point of view of effectiveness, but unlike them it is not a chance discovery. It was known that pantothenic acid was an essential factor



PANTOTHENATE



PANTOYLTAURINE

for the growth of hæmolytic streptococcus, and a compound was devised which by analogy with sulphanilamide should limit growth by competing with the natural factor. MCILWAIN determined the ratio of pantoyltaurine to pantothenic acid necessary to secure inhibition of growth of the bacteria in vitro, and he estimated the blood content of pantothenic acid in the rat; the dosage of pantoyltaurine was then arranged so as to produce the inhibitory concentration of the drug in the animal's blood over a period of time. Doses giving this level saved the animals, and smaller doses did not, which brilliantly supports the theories on which the treatment was based.

The era of chance in chemotherapy is not over. Our knowledge of bacterial and virus metabolism is painfully meagre and the lucky chance skilfully taken will continue to play a leading part in advances in this field. But progress will come more and more from planned experiments in which theory precedes achievement. Biochemistry seems the best weapon to achieve this, and has indeed been in a position for many years to give help in chemotherapy. Examples of interference with synthetic processes by drugs which poisoned the enzyme, or which being similar to the natural substrate combined with the enzyme and inhibited the synthesis, have been known for a long time. But EHRLICH'S concept of chemotherapy, which exercised so great an influence, was essentially chemical, and having no connexion with nutrition divorced chemotherapy from biochemistry. The credit for formulating the concept of drugs which could limit growth by competing with essential metabolites rests with FILDES and his school. The concept is delightfully simple. The growth of bacteria depends on the synthesis of complex substances from simple compounds, and on reactions which can supply the necessary energy for these syntheses. All along this synthetic path are essential substances, and any interference with their supply or use limits growth. The task of the chemotherapist is to discover these substances and then to inactivate them, or to devise counterfeit compounds which the organism will accept and too late find useless for its purpose. This view regards the animal host as a culture medium for bacterium or virus, which is what essentially it is, and points the way to further advances through biochemical investigation of bacterial and virus metabolism.

MATERNITY IN LONDON

IN London at present there is a lack of midwives; and at the same time the birth-rate is rising. Maternity is encouraged by Service allowances, but maternity beds are scarce. Many women prefer to be confined in hospital, and for years before the war the public health authorities encouraged this preference. Now they often go from hospital to hospital seeking a bed. Many come from outlying districts; some write from the country, or even take rooms near a hospital which is rumoured to have beds available. Actually it is doubtful whether any of the London voluntary hospitals will have vacancies before September, and the London maternity hospitals are nearly all booked up for months ahead. The number of maternity beds has been reduced through the loss of skilled staff, as well as by enemy action, and shortage of skilled staff is even more difficult to remedy than the loss of buildings or equipment.

The London County Council have maternity units in many of their general hospitals, and before the war, when the domiciliary midwifery service had been established, these hospitals admitted all cases of first confinement and all cases needing special care for medical or social reasons. Today, owing to the pressure on their beds, admission is restricted to women requiring it on some special grounds, and the local borough clinics do their best to refer for hospital confinement only those who cannot be attended in the home or sent to a reception area. Evacuation certainly has advantages; women who go are sure of being well looked after in the last two or three

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weeks of pregnancy and during confinement. But many women do not want to leave their homes and families or to be among strangers at such a time. Most of them have no intention of remaining away, and the fare home is a serious consideration, especially when they have had to be sent as far as York or to the West Country. Where evacuation is insisted on because there is no alternative the mother is quite likely to give up attending the antenatal clinic; she thus avoids getting sent away and eventually becomes an emergency admission at the nearest hospital. Some, having made the journey to the reception area, return just before confinement with no fresh arrangements in prospect. And even the reception areas are crowded; by the middle of February this year, for example, no London women could be booked for confinement in a reception area in March unless someone cancelled.

Confinement at home is all very well if the patient has a suitable home and someone to look after her. Many of the women have no homes: they live with relatives or in furnished rooms. The homes of others are unsuitable: many families are living in houses that were condemned before the war, or in raid-damaged buildings, and some in homes that are dirty and neglected. The health visitors naturally refer women living in such homes to hospitals, recommending admission. Even where the home is suitable, domestic help is not often available; though this difficulty may be met if the Minister of Labour establishes a home-help service. Additional difficulties arise in connexion with those unmarried mothers for whom evacuation happens to be unsuitable and who have no homes in London. The moral welfare workers take many of these girls into their homes and refuges, but few of these have facilities for confinement. Now that admission to hospital is limited—and unmarried women seldom book early—welfare workers are confronted with a real problem.

So as to admit more patients, the hospitals have reduced the average duration of stay in the wards from 14 days to 10. Some hospitals move their maternity patients to other hospitals on the third day. The nursing staffs work under constant pressure, and the danger of infection is of course increased; but, as already stated, the greatest handicap is the shortage of staff, resulting from the absorption of trained women into the Services, the evacuation of many from London, and the fact that the demand for nurses exceeds the supply.

AVOIDANCE OF POSTPARTUM HÆMORRHAGE

SERIOUS postpartum hæmorrhage should no longer be regarded as a bolt from the blue, an unavoidable and unpredictable catastrophe assailing the parturient woman. Everyone responsible for the safe custody of mothers in childbirth should realise that it is largely avoidable; in a well-run maternity service it should hardly ever occur. Forceps operations and cæsarean sections should not be associated with heavy losses of blood, and in a natural delivery, if the patient's general condition is good, the duration of labour within normal limits and the management of the third stage thoroughly understood by the accoucheur, postpartum hæmorrhage is most unlikely.

In the normal third stage the accoucheur's hand should be placed on the fundus, but the uterus should not be stimulated except for some express indication. After the third or fourth contraction a small spurt of blood emerging from the vulva shows that the placenta has separated, and it is a good plan to wait for the next contraction and then tell the patient to push the afterbirth out herself. In many cases she will be successful. This is the ideal method; it involves no possibility of shock for the mother and gives her the emotional satisfaction of accomplishing the entire delivery of both child and afterbirth herself. If she is unsuccessful the placenta can be expressed from the uterus in the usual way. A few women are predisposed to postpartum loss—those who are anæmic and in poor general condition, those in whom the birth of many children has impaired the contractile power of the uterus or a long labour has unduly fatigued the uterine musculature. Such patients require special precautions and an obstetrician should be present at their confinement. In these cases the management of the third stage does not differ from that employed with a normal patient, but if there is any sign of excessive loss Credé's method should be tried forthwith. If this fails the obstetrician should do a rapid manual removal of the placenta before the patient has had a serious loss and before she has become shocked by repeated attempts at Credé's expression. The disasters accompanying manual removal nearly all happen when the patient has been allowed to lose a pint or two of blood before the operation is undertaken; if removal is performed early and with all possible antiseptic precautions grave sequelæ will be rare. While preparations are being made for a manual removal the fundus should be controlled continuously. A general anæsthetic is the best choice; the induction should be rapid and the operation begun as soon as light third stage anæsthesia has been attained. The surgeon's hand should be liberally smeared with a bland antiseptic cream and the entire vagina filled with this before the hand is introduced into the uterus. As soon as the placenta has been brought into the vaginal canal the anæsthetic should be stopped, and the operation should of course be followed by a hot intra-uterine douche, which can be given while the patient is recovering from the anæsthetic.

In Australia MCINTYRE[1] advocates the control of postpartum hæmorrhage by the Monjon-Gabaston method, in which one to two pints of saline at 125–130° F. is injected into the umbilical vein. Where after a normal delivery the placenta is retained for more than half an hour and there is little or no hæmorrhage no harm and possibly much good can be done by the injection of saline into the cord and the subsequent expression of the placenta by Credé's method, but where the patient is actually bleeding this treatment, unless carried out by an expert in obstetrics, is surely a little hazardous. The injection takes a precious few minutes during which the patient is steadily losing and if it proves unsuccessful and manual removal becomes necessary the patient's condition will have deteriorated considerably. For general purposes, therefore, it seems safer to teach that if the Monjon-Gabaston technique is to be used it should be as treatment for retained placenta rather than for combating postpartum loss.

1. McIntyre, W. K. *Med. J. Aust.* 1942, ii, 517.

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During and after cæsarean section any woman who is anæmic or has been in labour many hours is liable to excessive loss from the placental site. The anæmic patient is probably best treated by pre-operative blood-transfusion. Hæmorrhage in all patients can be reduced to a minimum by rapid and skilful operating, and most important of all by a careful choice of anæsthetic. The uterus contracts down much better and the patient loses less under spinal than under general anæsthesia, but blood loss is least with local analgesia and this should always be used in the debilitated patient; it is pre-eminently suitable for cases of severe anæmia and placenta prævia. If severe postpartum loss is to be avoided after the forceps operation punctilious attention must be paid to several points not usually stressed in the textbooks. The anæsthetic should not be started until the surgeon is almost ready to begin; the induction should be as rapid as is compatible with safety; the patient should never be deepened beyond light third stage; and chloroform should only be used for the induction. After the blades have been applied extraction, although not hasty, should not be protracted. It is much better to perform an episiotomy and extract the child with moderate despatch than to spend half an hour inveigling the head over the perineum in an effort to avoid a laceration or tear. Long anæsthesia predisposes to hæmorrhage and all its attendant dangers. As soon as the child's head has been delivered it is a good plan to inject pituitary extract and the placenta can then be expelled with the first contraction which follows the birth of the child. The anæsthetic should be discontinued as soon as the placenta appears and the episiotomy incision rapidly sutured after the mask has been removed. A vigilant watch must be kept on the fundus throughout the whole procedure. The patient should not be allowed to come round from the anæsthetic with the placenta in situ; it is preferable to perform a manual removal and follow it with a hot intra-uterine douche.

Annotations

POOR MAN'S BEEF

THE exigencies of war have again raised the question of the relative merits of meat and dried pulses as sources of protein in human dietary. Textbooks on nutrition tell us that dried peas and beans contain as much protein as lean beef, but this statement has recently been criticised as misleading because, it is said, we do not eat our pulses raw. Stewed beefsteak contains 4½ times as much protein as cooked haricot beans. But, say the bean supporters, values thus calculated, without taking into account the relative calorie values, may be even more misleading. Stewed meat is 2½ times as calorific as cooked haricot beans. Therefore, on a calorie basis, meat has only about twice the protein value of the beans. Furthermore, if the protein values are calculated on an economic basis, twice as much protein can be obtained from beans as from stewing beef for the same cost. This is the argument put forward by Dr. Wokes in our correspondence columns. Other arguments on both sides can of course be produced. The proteins of legumes tend to be deficient in cystine, and for this reason they appear to be of low biological value when fed to rats as the sole source of nitrogen in the diet, but this lack is readily made good by other proteins in the normal human diet. There is no question that more calories and more protein can be imported in the same shipping space in the form of dried beans than in the form of fresh meat, and no special dehydrating plant or storage arrangements are necessary for beans. But cheese and dried milk provide more protein and more calories, weight for weight, than either. Pulses are valuable foods, but they are not adapted to form the only source of protein in the diet and no-one has suggested that they should do so—a man would have to eat more than a kilo of cooked haricot beans to make up his day's quota of protein. What we are asked to do is to supplement this quota with home-grown haricots instead of clamouring for more imported meat and dairy products. In recommending beans to ease the weekly food bill, however, it must be remembered that it is more expensive to buy protein as beans than it is to buy it as bread.

ANATOMY AT THE BARBER-SURGEONS HALL

THE long chain of Vicary lectures at the hall of the Barbers Company was broken by the destruction of that hall in the air-raids of 1940–41. Sir Hugh Lett on April 2 delivered the lecture for the first time at the Royal College of Surgeons; and thus the war has reunited in some sort the Barbers and the Surgeons after their 200 years' divorce, following an equal period of wedlock.

Sir Thomas Vicary, it seems, was a modest practitioner near Maidstone, when luck, aided by his own address, caused him to be appointed serjeant-surgeon to King Henry VIII. When admitted to the Barbers Company—he later became its master—he was largely responsible for bringing about in 1540 the union of the small and select Guild of Surgeons and the larger, wealthier, City Company of Barbers, the new company being the masters or governors of the mystery or commonalty of the Barber-Surgeons of London. His influence is shown by the fact that in Holbein's well-known picture the charter of incorporation is being handed by the King to him, although he was not then master of the company. The charter of the united company legalised dissection for the first time in this country by permitting the bodies of four criminals executed for felony to be handed over to the company for dissection or other surgical purposes: thus whereas in 1497 no mention of anatomy is made in a diploma granted by the Barbers Company, this subject was included in such documents shortly after the company's formation. The lecturer dismissed the claims of Caius to be the "father of anatomy" in this country, because (among other reasons) he was abroad at the relevant period.

The public dissections instituted as a result of this recognition of the science of anatomy by the State were held four times a year for three consecutive days. Members of the company were compelled to attend on two out of three of these days, under threat of fine—this being the first example of a compulsory post-graduate course. The rigours of attendance were tempered by mulled wine provided at the end of the lecture and by a dinner between the morning and afternoon sessions, which were, for obvious reasons, held only during the winter. Samuel Pepys attended one of these public dissections; but, to judge by his diary entries, he found the excellence of the dinner and conversation more worth noting than the lecture, which seems to have made no impression on his mind. An anatomical theatre, annexed to the Barber-Surgeons Hall, was designed by Inigo Jones, then surveyor to His Majesty, and opened in 1638. The clever use of the awkwardly shaped piece of land available, as well as the influence of the anatomical theatre at Padua—the first in Europe and almost certainly known to the architect—were demonstrated by Sir Hugh Lett from original plans and illustrations.

At the beginning of the eighteenth century, the fortunes of the anatomical school of the Barber-Surgeons were at a lower ebb because of the opening of rival

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schools at hospitals and elsewhere. In addition, the opposition by the public to the surrender at Tyburn of the bodies of criminals, particularly those of highwaymen, who were popular heroes, had led to rioting and the necessity for large bribes to the officials as well as an armed guard for the officers of the company. One such criminal added to the general excitement by returning to life after having been hanged for 22 minutes: he survived and his sentence was commuted to transportation. Finally, the inevitable division between the Surgeons and Barbers occurred in 1745, and the anatomy theatre, which would have been a precious relic in the history of medicine, was pulled down in 1785.

WELCOME RETURN

AFTER being suspended since March, 1940, the *Journal of Comparative Pathology and Therapeutics* has reappeared in slightly different form. When Sir John McFadyean founded it in 1888 this was the first British medical or veterinary journal to deal specially with pathology, for Sims Woodhead did not found the *Journal of Pathology and Bacteriology* until 1892. McFadyean was both editor and owner of the journal for 52 years, and since his death in February, 1941, his trustees have taken steps to implement his wish that a small board of veterinary workers should take over the editorship. The ownership of the journal has now passed to this board, consisting of Prof. J. G. Wright, Prof. T. J. Bosworth, Mr. J. T. Edwards, DSc, and Mr. R. E. Glover. The main change is the disappearance of editorials; the journal will now be limited to the publication of signed articles with a direct bearing on veterinary science.

ELECTROMYOGRAPHY

THE search for fibrillation and fasciculation is undertaken whenever a wasted muscle is under inspection. Unfortunately for the usefulness of the method, the minute flickering movements of fine fibrillation are only visible under the most ideal circumstances, as when the muscle is near the surface and not covered by much subcutaneous tissue, and the movements are more than usually active. Consequently it is usually taught that while fibrillation may be seen in the muscular dystrophies and with degeneration of the anterior horn cells it is absent after section of peripheral nerves or their destruction through disease. Electromyography shows clearly that this is not so, but that a constant sequence of events occurs which has a direct clinical application. The method is simple, and does not inconvenience the patient any more than does a hypodermic injection. The usual procedure is to stick a concentric electrode made of a fine wire running through the centre of a fine-gauge hypodermic needle into the belly of the muscle. The barrel of the needle acts as an earthed shield and the minute wire electrode picks up the electrical activity of units within a radius of 1 mm. The potentials are amplified by a standard amplifier, and records can be observed and photographed on a cathode ray tube. Weddell, Feinstein and Pattle [1] point out that the activity of normally contracting motor units and of fibrillation can be easily distinguished, and it is consequently possible to decide whether a muscle is innervated normally, partially or not at all. To explore the whole muscle may require about six punctures, but this is rarely necessary and gives only trifling discomfort. On the other hand much information is gained for instance in peripheral nerve injuries where muscles which are apparently quiescent are found to be in a state of continuous fibrillation. Since the area from which the electrode will record is minute, and the signals alternate very rapidly at the limits of the field, the method can be carried further, because by making three or four punctures in a muscle the average number of active motor units can be determined and their activity observed. In a recovering muscle it can be seen that more and more units are being activated, and the regeneration of the nerve filaments can be accurately followed. The method can therefore be used quantitatively as well as qualitatively. Consequently, as Denny-Brown and Pennybacker [2] showed, additional information of value in the clinical management of cases of muscle wasting is thus made available. One of the new observations made by Weddell and his colleagues in Oxford is that the degree of fibrillation in denervated muscle is in some way related to the metabolic rate of the tissue. It appears early in small animals, and can be readily induced in man by heat. It seems that, while the observation that fibrillation is absent after denervation is incorrect, in every case if the temperature is raised suitably fibrillation can be easily recorded. There is patently much more to be learnt, but the method is so simple that advance in knowledge should be rapid.

1. Weddell, G., Feinstein, B. and Pattle, R. E. *Lancet*, Feb. 20, 1943, p. 236.

DIAGNOSIS OF APPENDICITIS

THE view that an attack of appendicitis is an example of closed-loop intestinal obstruction, with inflammation and its signs and symptoms as important sequelæ rather than essential factors in the disease, increases the doctor's responsibility for very early diagnosis. But it also makes it easier for him to follow accurately the course of events, and to recognise and assess the signs and symptoms presented by an obstructed appendix in one of the less usual anatomical sites. Early diagnosis depends on knowing that the acute onset of central abdominal pain, followed by vomiting, followed by tenderness in the right iliac fossa occur in that sequence in the great majority of cases of acute appendicitis and hardly ever in other acute abdominal condition. R. A. Hughes [3] suggests the mnemonic: "First and all the time pain, next nausea, then tenderness, and finally fever with leucocytosis." Before the fever develops the pain will have changed from a colic to a continuous soreness or ache, and shifted from the umbilicus or epigastrium to the right iliac fossa. At the onset the patient feels as if movement or defæcation would ease the pain. When the right-sided pain has become established he knows that lying still is all-important. Later, if spreading peritonitis develops, he not only wants to lie still but must.

Abdominal examination during the first stage of the illness may reveal nothing. By the time the doctor is called, however, it is usually possible to elicit tenderness in the right iliac fossa. Guarding of the abdominal wall on pressure develops rather later, and rigidity later still. In some but by no means in all cases a localised area of hyperæsthesia can be demonstrated. To avoid being misled by the unusual case and by the case seen very early or very late, it is necessary to recognise the meaning of each of these signs and symptoms. The initial pain, being a colic due to increase of pressure in the lumen of the appendix and to the efforts of the appendix to expel its contents against distension of the unstriped muscle in its wall, resembles all other forms of abdominal colic: it is difficult for the patient to localise accurately, and it makes him squirm and hold his abdomen. Often it awakens him in the early hours of the morning. He vomits, or feels sick. Only the fact that the distended appendix is tender allows this stage of the disease to be distinguished with any degree of certainty from other abdominal colics. It must be remembered that the tenderness at this early stage is over the appendix wherever that organ may lie, so that a very low pelvic appendix may be tender only to rectal or to vaginal examination, and a very high retrocæcal one may be tender in the hypochondrium or loin. In the next stage the obstructed appendix with its fæcal contents becomes

2. Denny-Brown, D. and Pennybacker, J. *Brain*, 1938, 61, 311.
3. *Ind. med. Gaz.* 1942, 77, 342.

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inflamed, and the ischæmia of its wall, induced by a greater or less degree of strangulation, is followed by gangrene. If the tip of this inflamed appendix is not wrapped up by omentum, and happens to touch the abdominal parietes, an area of hyperæsthesia will be produced, which can be demonstrated by pin-prick or by pinching the skin. The high retrocæcal appendix may give hyperæsthesia in or near the renal angle; the pelvic appendix gives no cutaneous hyperæsthesia. Once the inflammation spreads outside the appendicular wall, the signs depend not only on the position of the organ but also on the success of any attempts at localisation of the infection. A tense and completely gangrenous appendix, suddenly rupturing into the general peritoneal cavity, will produce a train of symptoms which may suggest perforation of a peptic ulcer, except that with the ruptured appendix septic absorption will be much more rapid and devastating in its immediate effects. On the other hand, an appendix well wrapped in a thick omentum and lying in the pelvis may mimic a tubo-ovarian abscess. Guarding of the abdominal muscles is a sign reflexly produced when the sensitive parietal peritoneum is pressed on to an inflamed organ below the examining hand. It is commonly absent in pelvic appendicitis, and is an easily produced sign when the appendix lies near the anterior abdominal wall. Rigidity is present before the hand is laid on the abdomen; it is a sign of peritoneal irritation, and in appendicitis means that peritonitis is already established. Rigidity spreads from the lower half to the upper half of the abdomen as the infected fluid rises, and from the right to the left rectus muscle as pus spreads across from an abscess in the right iliac fossa. Torsion of the appendix is likely to produce more rapid gangrene than is obstruction by a fæcolith, and the sudden vascular ischæmia prohibits inflammatory change. It is in these cases, with rapid onset of gangrene, that the patient's life is endangered by a few hours' delay; they give point to Hughes's observation of the irrelevance of laboratory investigations. Leucocytosis will not be present in such cases until rupture and peritonitis have ensued, and then the level of the leucocytosis is of prognostic and not of diagnostic significance. McAdam Eccles [4] warns the unwary of the "appendix scar" which does not betoken a previous appendicectomy; and of the rare left-sided appendix. The appendix irritating the bladder and producing symptoms of cystitis, and that lying in contact with the liver and diagnosed as a "chill on the liver" are common enough to warrant his emphasis on these pitfalls.

TUBERCULOSIS NURSING

THE Rushcliffe Committee, it will be remembered, suggested that the General Nursing Council would do well to establish a supplementary part of the register for nurses trained and examined in the care of tuberculous patients. Whether the council will decide to take this step remains to be seen: there are good arguments for including a course in tuberculosis nursing in training for the existing fever qualification, but there are even better ones for making such a course a part of training for the general register. In a statement just circulated the council points out that experience in sanatoriums can already be recognised as a part of nursing training. Thus nurses taking full training in general hospitals may be seconded to sanatoriums for periods not exceeding 3 months; and schemes of affiliation may be arranged between general hospitals and sanatoriums and other special hospitals under which two years are spent at the sanatorium in training for the preliminary state examination, and a further two years at the general hospital in preparation for the final. Moreover, the council are prepared to consider any other schemes of combined training submitted, provided they include not less than two years in a general training school. Nurses in training for admission to the fever part of the register are permitted to spend 3–6 months in a sanatorium or in the tuberculosis wards of the fever hospital. There is a difference, however, between permitting a special course of this kind to be taken, and requiring it to be taken as a necessary part of a general or special training. Permissive legislation of this kind is often a useful way of trying out approved procedure but those who feel that experience of tuberculosis is a necessary part of every nurse's training would welcome a more positive decision.

4. *West. Lond. med. J.* 1942, 47, 43.

TREATMENT OF ANTHRAX

IN 60 cases of cutaneous anthrax, mostly acquired at a mill making lining materials from Chinese and Indian goat hair, Gold [1] of Chester, Pennsylvania, has compared the results of sulphonamide treatment with those of serum and arsenic. There was only one death in the series—one of the 20 patients who received large doses of anti-anthrax serum (average 874 c.cm.) with neoarsphenamine. This death Gold attributes to the timorous use intravenously of insufficient quantities of anti-anthrax serum and to the injection of serum locally around the pustule, the latter procedure facilitating the spread of bacilli along mechanically distended tissue spaces. In the remaining cases he systematically explored the field of the sulphonamide group with very promising results, though he sounds a warning note in view of the undesirable reactions which these substances may cause, and stresses the importance of control by frequent blood and urine examinations. Response to treatment was measured by the retardation and abatement of local œdema, and in the 3 cases where this was unsatisfactory chemotherapy was stopped and serum treatment begun. Sulphanilamide was used in one case and its effect was "not spectacular." Twenty-four patients were given sulphapyridine, 2–4 g. as first dose, and then 1 g. every 3–4 hours for 2 to 10 days, 12 patients needing 5 days' treatment; the average amount given was 29·9 g. In four cases a change was made to sulphathiazole because of gastric upsets, and in two to serum because the response was doubtful. Sulphathiazole was used in sixteen cases (including the four who had had sulphapyridine) in similar dosage; its effect on the œdema was not as rapid as that of sulphapyridine but it caused less systemic disturbance; one "near death" had to be given serum to ensure recovery. Sulphadiazine, tested in five patients, was found to be needed in much higher doses than the two former drugs as it checked œdema more slowly; there was, moreover, a greater proneness to hæmaturia. Gold concludes that the sulphonamides are a safe and reliable substitute for anti-anthrax serum. Sulphapyridine is placed first in therapeutic effectiveness, with sulphathiazole next and sulphadiazine third; but Gold regards sulphathiazole as the drug of choice because of the high incidence of nausea and vomiting encountered with sulphapyridine. In one patient pooled human convalescent serum, 375 c.cm., was injected intravenously with no apparent benefit. Two cases received a transfusion of 500 c.cm. of the blood of a patient who had recovered from anthrax 2¼ years before. One improved dramatically in 3 hours, but in the other the response was not so obvious. Gold thinks the transfusions of some value, but suggests that normal whole blood would be just as beneficial.

The combination of serum with neoarsphenamine has proved highly satisfactory—Hodgson,[2] for instance, reported forty-one cases in Liverpool without a death but the sulphonamides seem as effective and they have some practical advantages. Thus Gold's average total dosage of sulphathiazole, 30 g., costs roughly 4*s*., whereas the 1000 c.cm. of anthrax serum which an average case

1. Gold, H. *Arch. int. Med.* 1942, 70, 785.
2. Hodgson, A. E. *Lancet*, 1941, i, 811.

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will need costs some £12, and the arsenical will add perhaps another 10s. Again, the sulphonamides can be given by mouth, whereas serum and neoarsphenamine must be given intravenously. In the mildest cases, where the infection is situated well away from the neck, Hodgson thinks an arsenical will be effective without serum, but all others should receive either full doses of a sulphonamide, or serum plus arsenic. Prophylaxis has not been proved effective, but where infection may have taken place Hodgson gives 5–20 c.cm. of serum intramuscularly—it can do no harm, he says, and may do good.

RADIUM TREATMENT FOR PEPTIC ULCER

MANY attempts have been made to reduce gastric acidity experimentally, but in man it has been difficult to achieve any lasting reduction. Moreover, the association of high gastric acid and peptic ulcer is one of great complexity. Many results, notably those of Hurst and Venables, have shown that acidity may increase as a peptic ulcer heals, and others have shown that, though symptoms may disappear and healing take place with frequent milk feeding, the acidity may be little if at all reduced during the treatment. Something more than mere reduction in acidity is thus required in the control of peptic ulceration. Nevertheless the observations of Jenkins and McGeorge[1] in New Zealand, who have tested the response of the gastric mucosa to radium irradiation in patients with symptoms of duodenal ulcer, are instructive. They first performed a control gastric analysis after the subcutaneous injection of 1 mg. of histamine acid phosphate in the fasting state. Analyses were then performed every 10 minutes for the next 50 minutes. Subsequently the patient swallowed a rubber tube carrying in its end two 25 mg. needles of radium; this was left in the stomach for 4–5 hours daily until a total dose of 2000–2500 milligramme-hours had been administered. At varying time periods afterwards further histamine "test-meals" were performed and results were compared. By an ingenious arrangement the radium was prevented from coming in contact with the stomach wall, and in the only case subsequently operated on no evidence of damage to blood-vessels was found by histological examination. In 13 of 14 patients examined a reduction in gastric acidity followed the irradiation, as well as a reduction in rate of secretion. These changes were moderate in degree but seemed to persist for periods up to more than 2 years, for which time some of the patients were followed up. No ill effects were observed, and in 7 of the patients all symptoms disappeared; in 5 others clinical improvement resulted, though treatment with alkalis was still sometimes necessary.

DEATHS DUE TO SULPHATHIAZOLE

DURING the last twelve months, severe toxic effects have been reported after sulphathiazole administration which have been of a different kind from those familiar ones produced by other sulphonamides and lately discussed in these columns.[2] The latest example[3] was in Canada, where a middle-aged man with an ischiorectal abscess was given 4 g. of sulphathiazole before operation and 12 g. during the six days after operation, after which his temperature suddenly rose to 105° F. Sulphathiazole was given with intermissions during the next four days, some of the doses being followed by rigors and rapid rise of temperature. On the ninth postoperative day he developed oliguria and azotæmia, on the eleventh day an erythematous rash appeared on the face and body, and on the twelfth day jaundice set in. He died on the fourteenth postoperative day in spite of blood-transfusions and other treatment. At autopsy, extensive focal necrosis of the liver was found, together with focal necrosis of the myocardium, spleen and adrenal glands. Similar cases have been described by Lederer and Rosenblatt[4] of Brooklyn, and Merkel and Crawford of Baltimore.[5] The pathological changes consist mostly of focal necrosis in the liver, kidneys, lungs, spleen, heart and other viscera, the exact distribution being variable. These lesions may be due to the direct toxic action of sulphathiazole, but they have rarely been observed in animal experiments, and in the few patients who have developed them the blood-concentration of sulphathiazole has usually not been high. More probably they are severe manifestations of sensitivity, arising from the same cause as the fever, rash and so on, which sulphathiazole seems especially liable to produce.[6] In many but not all of the fatal cases febrile reactions have been a prominent feature of the clinical history, and this hypothesis would account for many of the phenomena observed. The practical conclusion may be drawn that sulphathiazole should not usually be given for more than seven days at a time, and any patient who has received a sulphonamide previously should be put under careful observation the second time. Fever after a period of normal temperature during sulphathiazole therapy should be regarded as a danger signal, and if there are no signs of an exacerbation or reinfection to account for it the sulphathiazole should be discontinued. These fatal cases are too rare to outweigh the advantages of sulphathiazole, but they should be borne in mind when treating an infection which would be as readily controlled by another sulphonamide. They are another argument for the desensitisation of all patients who develop sensitivity during chemotherapy, and therefore for the establishment of a quick and trustworthy method of desensitisation, based perhaps on the procedure described in detail by Erskine.[7]

A CENTRAL MEDICAL BOARD?

AMONG possible features of a comprehensive medical service indicated by Mr. Thomas Johnston, Secretary of State for Scotland, addressing representatives of the medical profession and Scottish local authorities, was the appointment of a central medical board which would operate as an employment agency or appointments board for medical men anxious to play a part in the new service. Without some agency of this kind, he said, there would be difficulty in establishing the new system in time to deal with the many thousands of young doctors returning from the Forces and seeking to enter civil practice. Other tasks of such a board might be the administration of a superannuation scheme, the arranging of postgraduate and refresher courses, the supervision of the annual intake to the profession, and the administration of arrangements for securing to the health authorities assistance and advice in appointments to senior and consultant posts.

1. Jenkins, J. A. and McGeorge, M. *Arch. intern. Med.* 1942, 70, 714.
2. *Lancet*, March 13, 1943, p. 339.
3. Simon, M. A. and Kaufmann, M. *Canad. med. J.* 1943, 48, 23.
4. Lederer, M. and Rosenblatt, P. *J. Amer. med. Ass.* 1942, 119, 8.
5. Merkel, W. C. and Crawford, R. C. *Ibid*, 1942, 119, 770.
6. Lyons, R. H. and Balberor, H. *Ibid*, 1942, 118, 955. Moeschlin, S. *Schweiz. med. Wschr.* 1942, 72, 510. See *Bull. War Med.* 1943, 3, 294. Nelson, J. *J. Amer. med. Ass.* 1942, 119, 560.
7. Erskine, D. *Lancet*, March 20, 1943, p. 382.

TUBERCULOSIS CAMPAIGN IN IRELAND.—At the end of last year it was proposed to set up an anti-tuberculosis league in Ireland to conduct a national anti-tuberculosis campaign (*Lancet*, 1942, ii, 744), but it has since been suggested that the campaign might be more effective if conducted under the auspices of the Irish Red Cross Society, which has already a widespread organisation. The society has established a tuberculosis committee which will consist of the members of the provisional executive of the league, and the same number of members of the society. It is expected that this committee will set up subcommittees to deal with the different branches of the work: statistical investigation, education, public health, propaganda, veterinary medicine and bovine tuberculosis.

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Special Articles

NATIONAL HEALTH SERVICE

BMA DISCUSSIONS

AT special conferences held in London on March 31 the representative body of the British Medical Association, and the representatives of local medical and panel committees, were asked to ratify the arrangements made for consultation between the profession and the Minister of Health (*Lancet*, March 20, p. 375). Mr. H. S. SOUTTAR (chairman of council) explained that on Feb. 18 the Minister invited the BMA to bring representatives of the profession to meet him on March 9. To plead for more time would have been unwise, for the Minister was in any case meeting the representatives of local authorities and of voluntary hospitals. The Government having decided to adopt a large proportion of the Beveridge proposals, it was felt that the invitation to enter into discussions without commitment should be accepted, and the council, in consultation with the royal colleges and other bodies, had accordingly nominated a suitable committee. It would be impossible to find a stronger one.

A Matter of Urgency?

A number of speakers argued that the council should have postponed action till after March 31 when the Minister's proposal could have been placed before the representative body and the panel conference. Dr. G. DE SWIET thought the Government were trying to appease public opinion and he saw little use in plans for a medical service if the rest of the Beveridge report was side-tracked—if there was to be no Ministry of Social Security and perhaps no liquidation of approved societies. Where was the hurry for this self-appointed body to meet the Minister of Health? Dr. D. L. S. JOHNSTON held that the BMA could and should stand up to the Minister. Dr. A. SMITH POOL deprecated speed in reform of medical practice. Delay would not deprive people of medical care, and the 14,000 doctors on Service had a right to be heard before any final settlement was reached. Dr. J. A. IRELAND also saw no urgency. In the 1910 negotiations there had been at least a likelihood that doctors would receive more remuneration for work done, whereas now the probable outcome was an end of private practice. Dr. C. A. BINNEY spoke of the importance of getting on with the war and leaving decisions till it is over. Dr. JOHN BECK would have waited till the Government disclosed its intentions. Dr. J. B. JESSIMAN, on the other hand, felt that the disclosures already made by the Minister made nonsense of the assurance that consultations would proceed, not on the basis of any preconceived plan, but "from the ground."

Supporting the council's action, Sir KAYE LE FLEMING thought it would have been impossible to stay the Minister's hand. Dr. HOWIE WOOD said that the council had given nothing away, and Dr. W. W. FOX saw nothing undemocratic in provisional action by an executive elected democratically. Dr. P. INWALD asked how, as responsible people, the BMA could refuse to negotiate with the Government, which had a right to introduce a new service if it wanted to do so: a mistake had been made in 1911 in opposing a progressive measure. Major SCOTT STEVENSON had come hotfoot from the Hebrides to object to the arrangements, but had found them fully justified. His own view was that the Ministry would do well to deal with its own affairs—for example, housing and nutrition—before butting in on those of the medical profession. But the council was quite right; the matter was urgent, though the urgency arose only because the Ministry was trying to throw a sop to a disappointed public.

Prof. R. M. F. PICKEN, reviewing the various proposals for reform issued by the BMA since 1928, said that the democratic machinery had been constantly used. The profession could enter the discussions prepared as it had never been before, and he did not think it could be said that the Association had allowed itself to be rushed. He saw no reason to attribute machiavellian motives to the Government, but they wanted their groundwork done before the war nearly approached its end.

Dr. H. G. DAIN had no fear of a stampede. It had been urgent to "get in at the start," but the discussions would take place decently and in order. Doctors now away must be consulted and no extension of services was possible while the war went on. With other council speakers Dr. Dain drew a sharp distinction between the present *consultations* with the Minister, which committed nobody, and possible later *negotiations*. Before negotiations were undertaken a mandate would be needed from the representative body and the panel conference, and the negotiating committee might require different personnel.

The importance of moving as a united body was emphasised by Mr. SOUTTAR. Recalling the history of 1910–11, Mr. MCADAM ECCLES hoped that true agreement would this time be reached on fundamentals.

100% or Less?

Professor PICKEN thought that the Minister ought to be given a lead on the question whether *all* members of the community should be covered by the comprehensive medical service. At the last representative meeting the vote had been equivocal, and the panel conference in November had been strongly against extending the service to everyone.

Dr. R. W. RAE feared that inclusion of the whole population in the scheme would put too much power in the hands of the Government, who could then bring in a salaried State service whenever they wished. Dr. J. R. BAKER said that Beveridge insisted on a 100% contributory basis, and to leave out a small proportion might torpedo the whole plan. Private practice outside the scheme could be retained, but he would hate to see members of the profession now in the Forces dragged back into the competitive scramble seen in many parts of the country today. Dr. R. H. MOLE believed that the doctor-patient relationship would remain unsatisfactory till the money side of it was removed. It was essential to do away with the difference in prestige between doctors receiving private fees and those paid by capitation fees. The service would be better if it were universal—i.e., if civil servants and others concerned knew that their own persons and their own families depended on it.

The representatives agreed with Dr. S. WAND that it would be inadvisable at this stage to make any declaration on this subject.

Representation of Minorities

Dr. R. W. COCKSHUT asserted that though democracy protects the rights of the minority it expresses the will of the majority. Representatives must represent the majority view. The profession was at present united against a salaried State medical service as never before. Yet the representative committee meeting the Minister contained strong advocates of such a service. How could a man represent the BMA when opposed to its views? "This is not democracy: this is anarchy." Unity offered the only hope of either justice or mercy, and Dr. Cockshut thought the profession must stand firm on freedom. Dr. D. L. S. JOHNSTON also wanted to abolish the present committee and elect a new one free from representatives in favour of State salaried medical service.

Dr. GORDON WARD said that the Medical Practitioners Union, which was founded 29 years ago and had 5000–

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6000 members, should be represented on the committee. The Minister had promised to consult with the MPU separately, but it was wrong that he should have seen even the Socialist Medical Association separately. There should be a united committee, including 2 representatives of the MPU.

Dr. COCKSHUT said that the MPU was in favour of a full State medical service and it would be disastrous to admit it to the committee. Other speakers pointed out that this applied equally to the Society of Medical Officers of Health, and held that any section of the profession wishing to coöperate should be allowed to do so; otherwise one might be played off against another. Dr. F. M. ROSE regarded exclusion of this kind as undemocratic; an effort should be made to bridge the gap between the MPU and BMA. Dr. HOWIE WOOD, for his part, wanted evidence that the MPU would play fair.

Dr. E. A. GREGG said he had left the MPU because it was more interested in getting members than in the welfare of the profession. He entirely disbelieved the statement that it had 5000–6000 members: the subscription income for 1941 was £5833, and the subscription was £2 2s. (Dr. WARD: No). The MPU would promote disunity within the discussing body just as it had done at the court of inquiry into the capitation fee. It did not matter if the Minister saw the MPU separately: he would attach no importance to its views, and it did not represent the profession. Not a few of its members had joined merely to get furniture cheaply through its agency.

Dr. GORDON WARD remarked that Dr. Gregg, who had been president of the MPU, had the usual enthusiasm of the convert. The auditor's figures showed the membership at the end of 1941 as 5327, and the union paid its Labour Party affiliation fees on this basis. Certainly this total included members whose names were retained for a time though their subscriptions had lapsed; but this was the normal practice in professional organisations. He was not the sort of man who would support an organisation such as Dr. Gregg described.

Resolutions recommending representation of the MPU on the committee were defeated. On the other hand the panel conference approved by 84 votes to 55 a motion by Dr. W. JOPE that Scotland should be allowed to elect six representatives to meet the Minister, instead of accepting those nominated by the council. (A VOICE: "If Scotland has free choice why shouldn't England have free choice?") A separate committee with 52 members is meeting the Secretary for Scotland.

Capitation Fee Again

Several representatives felt that discussion with the Ministry on a new health service should not begin until the capitation fee payable under National Health Insurance has been satisfactorily settled. Dr. J. R. LANGMUIR had little confidence in the Ministry in view of its record since 1937, ending in the latest refusal to meet an unanswerable case. Dr. A. BEAUCHAMP, however, argued that any new negotiations should keep clear of the old trouble; Dr. F. E. GOULD thought that though an extra 6d. or 1s. might be acceptable as an addition to the capitation fee, its acceptance would be a very bad basis for negotiating a new scheme; and Dr. PETER MACDONALD said that if, as was quite likely, payment of practitioners in a new service was by capitation fee the present fee would be utterly inadequate, and therefore should not be the representatives' minds. The capitation fee, Dr. GREGG agreed, had nothing to do with the Beveridge report.

At the end of the panel conference Dr. T. J. COSTELLO for Lancashire proposed "that this conference, being disgusted with the reply received from the Minister of Health, now calls upon the Insurance Acts Committee to consider the advisability of recommending insurance practitioners to give notice to terminate their contracts." Unless practitioners were prepared to do this, he said, it was a waste of time to discuss the subject further with the Minister.

Replying as chairman of the IAC, Dr. GREGG said that a very serious position had now been reached. A letter from the IAC to the Minister dated Feb. 12, 1943, said:—

"You know perfectly well that the Insurance Acts Committee is deterred by considerations of national interest from advising insurance practitioners to withdraw from their insurance contracts at present. But for such considerations of national interest the Insurance Acts Committee would, indeed, advise that step, so deep and so widespread is the dissatisfaction within our ranks. The committee cannot escape the conclusion that you are taking advantage of the public-spirited attitude of insurance practitioners in this matter."

A questionnaire was going to panel committees and if they sent back the cheering news that they were prepared to stand firm and resign, Dr. Gregg would feel honoured if it fell to him to say to the Minister that, in view of the way it had been treated, the medical profession had finished with the Insurance Acts.

Decisions by the Conferences

The following resolutions moved by Professor PICKEN at a preliminary conference of all the representatives, with Dr. DAIN in the chair, were subsequently adopted, with few dissentients, by the representative body (chairman Dr. PETER MACDONALD) and the panel conference (chairman Dr. J. A. BROWN):—

1. That the Government's invitation to enter into discussions without commitment be accepted.

2. That a committee representative of the profession as a whole should, in response to the Government's invitation, now enter into discussions with representatives of the Minister of Health on "a scheme for comprehensive health and rehabilitation services, for the prevention and cure of disease and restoration of capacity for work, available to all members of the community" (Assumption B of the Beveridge report), in the light of the following undertakings now given:—

   (*a*) That, at the conclusion of the discussions and at the appropriate time or times during the discussions, but in any case before negotiations open and before any proposals are submitted by the Government to Parliament, the full machinery of the Association, including the council and its committees, groups, panel committees, divisions and the representative body, will be used to consider the Government's proposals and to decide the Association's view thereon.

   (*b*) That every practicable step will be taken to give all members of the profession, whether members or non-members of the Association, an opportunity to express their views and in particular that every practicable step will be taken to give to members of the profession on Service an opportunity of expressing their views, to assess those views, and to present them to the meeting or meetings of the representative body called to consider any proposals by the Government.

3. That the composition of the representative committee as reported in the statement published in the *British Medical Journal* of March 20, with the additions announced at this meeting, be approved.

The additional members of the committee will be: Dr. J. H. Sheldon (Wolverhampton) and Mr. H. J. McCurrich (Hove) to represent provincial non-teaching hospitals; Dr. Roland Williams to represent rural practitioners; a general practitioner to be nominated by the Society of Apothecaries of London; and representatives of the profession in Northern Ireland. Of 39 members so far selected, 19 are in general practice. As recommended by the panel conference, Scotland will probably be invited to elect new representatives, other than those already nominated by the royal Scottish corporations.

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STATISTICS OF OCCUPATIONAL MORTALITY

Prof. J. B. S. Haldane, in a lecture to the Socialist Medical Association on Feb. 4, took as his text the Decennial Supplement on Occupational Mortality. The Registrar-General, he said, classifies the whole male population into five social groups. Deaths from all causes in the five classes show a considerable gradient, the poor (class 5) dying far more than the rich (class 1). In the towns of northern England, for example, class 5 men between the ages of 20 and 35 have 236% of the death-rate of class 1 men. Urban poverty is clearly a great killer. Most diseases, especially respiratory diseases and tuberculosis, kill the poor much more than the rich; but there are some exceptions: appendicitis and cirrhosis of the liver have a considerable reverse gradient, being commonest among the middle class; leukæmia, acute endocarditis, angina and prostatic disease are commoner among the rich than the poor and so is suicide, with a considerable number among middle-class shopkeepers.

The most deadly occupations are those of the tin and copper miners working underground with a mortality of 342% of the average. The other men in dangerous trades in decreasing order are sand-blasters, other metalliferous mine-workers, stevedores, slate-miners, glass-blowers, kiln and oven men in the pottery trade, and innkeepers. All have a death-rate of more than 50% over the average. The risk, in all these trades except the last, is dust, and a large number of these deaths are classified as due to chronic interstitial pneumonia which is substantially equivalent to silicosis. Potters' deaths from bronchitis are about three times the normal; in some trades there is compensation if death is registered as due to silicosis; but for the two out of three potters who die as a result of their trade there is none.

The pathology of disease in workers in the dusty textile trades, including cotton blow-room workers, cotton-strippers and grinders, is unexpected. The characteristic finding here is not so much lung disease as nephritis, and this subject has yet to be investigated. Some dusts are harmless; limestone-miners are conspicuously healthy, their death-rate from phthisis being less than half that of the general population. Shale dust is sprinkled in mines because the mixture of shale dust and coal dust is not explosive. It would be worth trying to sprinkle calcium carbonate where men exposed to silica risk are working.

The lowest death-rate is among agricultural machine workers who live a healthy life in the country but get higher wages than the average agricultural worker and drink less than the average farmer. Then come radio-operators on land, draughtsmen, bank and insurance officials, canvassers (other than insurance officials), chemical workers, gamekeepers, teachers, civil servants. All have death-rates below 70% of the average; but it is not clear what all these groups have in common. Those in trades with most deaths from accidents are stevedores (429% of the average); slingers and riggers (300%), coal-miners, stone-quarriers; shunters on railways and plate-layers. Apart from miners all are in transport, the worst being water transport workers. Railway transport as a whole is conspicuously healthy and road transport about average.

The highest death-rate from cancer is among glass-blowers with 225% of the normal. This is partially due to cancer of the lips and mouth, an occupational hazard, but there is an excess of cancer in other sites also. Stevedores, leather-dressers, dockers, furriers, tin and copper miners, gas-producer men, kiln and oven men also have high rates for cancer deaths. The great cancerous trades of the past are either almost disappearing, as in the case of shale-mining, or are much healthier (e.g. chimney-sweeping).

What should be done about these dangerous occupations? The Beveridge report, said Professor Haldane, contains a suggestion which is extremely important if properly developed. In occupations which have a high mortality-rate (i.e. where the compensation to be paid exceeds 150% of the normal) the industry should be specially taxed to pay for that extra. This would give the industrialists an economic incentive to improve health conditions. But the occupations must be adequately classified; the burden should not be on the industry as a whole but on the particular groups which are in a position to improve matters. Research should be conducted on a larger scale and less spasmodically; and there is a need for education especially of the trade unionists concerned. He asked: "Do we want to have anyone employed in occupations which have a very high death-rate, or can we find other methods of attaining the desired product?" He thought that in this country we have enough material resources to eliminate most dangerous trades by producing the same end-product by entirely different methods. There would remain some necessary occupations which had a hazard to health. For these we might follow the lead of the Soviet Union in arranging shorter hours, better conditions, special diet and increased medical supervision.

In England Now

A Running Commentary by Peripatetic Correspondents

THE club is really too big. Neither the Consultant Physician nor I knew the two who sat down to share our luncheon table, yet we both thought they seemed somehow inappropriate. The younger was more a neutral type but the elder had, well, an unattractive personality—prominent incisors and a hypergonadal voice—but nothing wrong with his lungs. You can sit beside some conversations and never hear a word; others compel your attention however reluctant, and I saw the CP was suffering as I. The two had been holding forth on the rigours of austerity, and the younger told without disapproval how his daughter had checked herself against an austerity quiz in a women's magazine, and had to confess that she was not following a single economy mentioned. The elder one giggled. This brought the CP teetering on his stimulation threshold, and the other completed the process by following up with "Yes, they are carrying things to a ridiculous point—this bath nonsense for example. One naturally can't drop one's daily hot bath." The CP straightened his massive form and roared "Harrump! Pernicious rubbish. It's unpatriotic, enervating and unhygienic. Look what happened to the Greeks and Romans when the baths became their clubs. Sapped their energy. Led to degeneracy and effeminacy. *And* the daily bath is unhygienic. Yes, sir, you heard me correctly! Let me finish. You have not realised, in fact you did not know, that your integument is an active, living, growing tissue which is completed and protected by a fine layer of keratinised epithelium—that is, minute hard scales. This slowly and continuously wears away and is as continually replaced. Now, sir, you steep this beautiful protective covering in hot water till the cells are soft and sodden, you even intensify the process by using bath salts." The other again attempted to interrupt but a hand like a main road signpost held him up and the lecture swept on. "Then you soften them still further with soap and scrub them off with brushes and loofahs. Finally you remove all that have survived by rubbing them off with a rough towel. This exposes the lower layers of the skin cells. This denudation is no way to treat your skin, it is unphysiological and ungrateful. I have not mentioned other effects of hot baths on muscle tone, blood-pressure, blood-chemistry and so on; nor the work of that Cambridge fellow on the relation of excessive bathing to relative infertility—but you wouldn't understand that, it's too technical. Now, sir, that is part of the medical side of the question for you to think about since the necessity for saving fuel and water does not appeal to you. Good-day, sirs! Come along to the smoking-room, doctor, where we can have our coffee in peace."

I complimented the CP on his counterblast, pleasing him mightily; but added there was a point when bathing became advisable and asked what he would prescribe. "It is always difficult to steer a nice course. The head of a Cambridge college is alleged to have met a demand for bathrooms with the astonished remark that the men were only up for ten weeks. That I feel is rather long. For an entirely different practice, Martin Luther prescribed '*zweimal in der Woche*,' and as I always felt Luther was given to exaggeration I halve his advice to my patients. Bath once a week squares with the well-established English practice of Saturday-night ablutions, and if your advice coincides with the

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existing practice of the majority it is much more acceptable—and much more likely to be followed."

* * *

My sister writes poetry and gets it published too. She can't, of course, equal Browning who always got God and/or death into the last line, but she generally manages it in the last verse. I often write rhyme and always contrive to be vulgar. Is it the same gene? In Mr. Ford's little green book, which has given me intense pleasure for months, he stresses the versatility of genes—a single one, for instance, produces polydactyly, retinal degeneration, mental deficiency, obesity, and hypogenitalism. Rather like our vicar, who plays scratch golf, breeds ferrets, preaches a damn good sermon, but rumbles abdominally at Mothers' meetings. Take five or six thousand talented blokes like that, all with their allelomorphic (it's words like that which give genetics a bad name!) partners, make them into a community with the subsequent cancelling of extremes, with club and clique formation, counter-balancing of opposite opinions, with a mutual lust to live and live harmoniously, each fulfilling his or her fun and function, then you have a pretty good illustration of the genetic constitution of man. In short what the man is to the gene the community is to the man. Sometimes lately on my rounds like some tyro Paul I have been stricken by the impact of revelation. What amazing things we are, even the most gargoylian of us, living tombs, massive museums immortal, imperfect harmonies from the crude din of chaos, world histories in being, wanton packets of assorted seeds from Woolworth's! Yes, if man is to progress, genetics must be the Great Guiding Science. In 2 or 3 hundred years with the help of breeding experiments (Why shouldn't sibs mate? The classic gods, the Ptolemies and Byron all did. Oh, don't be so 20th century!) we ought to be able to provide genetic maps for all. I envisage a putative young lady who wants to have a poet child—poets will be highly prized then—trailing up to the Municipal Genetic Centre with her own and half a dozen suitors' maps. "You can't 'ave 'im, Miss. Why, 'e's got a vulgarity enzyme gene; it would write limericks. Nor this one neither. Look at 'im; 'e's got the dominant word-seeing genes. . . ." Later still they'll be much more advanced. With the help of a super-electron microscope, microsurgery and a little tact they'll be able to remove or transpose our erring genes. Someday a jot of that, which is I, may be a great poet, the vulgarity part being in the micro-sloppail, somewhere about A.D. 3000.

* * *

Step by step I have been advancing in the amateur veterinary line. It started with the usual dog-and-cat practice, later embracing chickens and ducks, who are at present even more beloved by their owners. I no longer think a member of the family has sickened if I am told "Hezekiah is ill": these feathered chums seem to be named exclusively from the Old Testament. From this you may have gathered we are temporary war-time countryfolk who if we are unable to go to town can at least have an egg for breakfast, if the hens are willing. The results are probably more satisfying than two hours of Greta Garbo. Everything was lovely at the beginning until disease reared its head, and somehow the handy sixpenny books on fowls and things did not help much; our perverse creatures never suffered from the common complaints mentioned in the last chapter. My reference library, by the way, is housed in Mr. Smith's hospitable bookshop, consulted between buses. My pharmacopœia too was simple: a "pepper-up," a "settler-down," a "bowel opener" and a "bowel stopper"—no fancy gradations. All or nothing is our motto in these parts.

With the arrival of a pig new complications arose, for somehow pig-keeping is looked upon as a major art. Children are considered capable of looking after mice and guinea-pigs; does mere size require special skill? We did not think so until poor Solomon Pig lay ill with the "scours." Our local statistician, temporarily off racing, said the mortality was 999 per 1000, the farmer advised a drench but kindly explained the drench was likely to fall upon the drencher ("Pigs is awful difficult"). His pigman, obviously a naturopath, suggested a walk round the garden and the freedom of the cabbage patch, if he was too far gone no damage would result; if he sampled anything—well, what did a few cabbages matter when 10 score of bacon was in the balance? The latter won the day because I was naturally diffident in the face of authority. Solomon was led, shaking greatly, down the garden path where he slowly settled down in the rubbish heap like a steam-roller going to its last rest. Three hours later we carried him into the stye and in the absence of the local talent proceeded to treat the matter scientifically, just as if the pig had joined the panel. An apple filled with castor oil was accepted, and the results noted with satisfaction by us if not by Solomon. Two codeines were fixed with toffee firmly to the teeth and duly swallowed with what seemed his dying breath. Yesterday, three months later, he returned as dry-cured bacon—1 cwt. 1 qr. 5 lb.

This case probably corresponds to the successful treatment of Mrs. Brown, dramatically cured after 10 years of cruel pain, for cases then rolled in. A piggy bilateral inguinal hernia cured with modern cotton technique resulted in a good market price and surprisingly enough a fee for me (one calf skin and a supply of firewood). This was a record since the treatment of fowl coccidiosis (a supply of straw weekly for life). The practice was now looking up and then the great day came when I was called to see a horse. I suppose this corresponds to the day, in Harley Street, when the first duchess presses the door bell. The first patient in this exalted sphere was normally a beautiful animal, but now with a temperature of 104° F. and staring coat he looked almost as dejected as his owner. I determined that this must be an example of the scientific approach and modern therapeutics. His chest was examined and bronchopneumonia diagnosed, the nasal discharge cultivated and typed and a blood-culture grown which corresponded and gave us a hæmolytic staphylococcus type 3. A glittering stethoscope if used in a stall, I discovered, will usually be followed by the risk of concussion for the user; I always now use the ear directly applied. Treatment seemed useless, for in spite of sulphanilamide given in the hope that this strain of staphylococcus was susceptible, our horse grew worse and worse, growing into the most pathetic sight—legs filled and abdomen pendulous with fluid—until all that remained was a humane dispatch. Thorough to the end, I demanded a post-mortem. Inside the knacker's shed the horse was strung up by two legs and beautifully skinned by the knacker who looked like the post-mortem attendant in any other pathological department. The surroundings—for now we could see in the gloom—were grotesque; a fœtal calf, a heap of bones and a pile of black somethings lay around the coppers (the boiling, not the arresting kind). The resident hens strutted around, looking almost too well-fed. He opened the animal and when the groom saw what keeps his legs apart while astride he departed to recover in the open air. After we had dealt with yards and yards of baggy entrails we delved into a thorax which seemed as deep as an air-raid shelter; when our friend the knacker disappeared to cut out the apices of the lungs I felt we should have to tie a rope on his legs for his extraction. Result, a huge abscess of right upper lobe, secondary to the bronchopneumonia, and that case was complete. To me, interesting variations from human pathology were the collection of botts in the stomach (presumably the larvæ of horse flies, all tightly adherent to the gastric mucosa) and the mass of small red worms in the walls of a thickened cœliac axis. I was also amazed at the small tortuous external auditory meatus.

As we left the yard I looked back at the shed where dismembering was now in full swing; from the door came sailing the hooves of the departed, looking as if he had cast them in a skittish moment—as slippers fly off when we try to land a kick on that awful dog from next door.

* * *

An unexpectedly sharp pang of regret assailed me as I turned to give her a farewell glance as she stood in the middle of a dismal car park early one March morning. We had been together for more than two years through all weathers, and she had never let me down. We had seen much of the progress of the war together. Those drives up to town throughout the winter of 1940–41, when some new vista of devastation greeted us on each visit and when the attempt to choose a route that had the minimum of diversions was rapidly given up as new

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diversions appeared every week. Those days when hitch-hiking was so popular and we were always being accosted. The day when, being held up at some traffic lights on the outskirts of Town just as the siren sounded, we noticed a young mother holding an infant tightly to her breast and obviously terrified. Never was the offer of a "lift" more gratefully accepted. She had just been bombed out of her home and was on her way to a sister who lived further out in the suburbs. Her sister had no idea she was coming, but she had no doubt as to the welcome she would receive; such is working-class camaraderie. We had sailed past convoys on the roads; we had been stopped by Home Guards on exercise and asked for our identity cards; we had been stopped by local police and asked if we knew how to immobilise our car in the event of an emergency. How she rocked with silent mirth at my reply that I would remove the distributor and, if necessary, smash the carburettor and drive a nail into the petrol tank! We had carried all sorts of loads—distinguished admirals, professors, surgeons, physicians, students, invalids, books, papers, groceries, furniture, livestock. But whether acting as taxi, removal van, grocery van or merely private car, we had enjoyed it all. We had seen the sun rise after a hectic night trying to bring some relief to the victims of air-raids. I had hoped we might see the war through together, but it was not to be; the passage of time was not to be stayed, and so we finally parted. I only trust that her successor will give me as loyal and efficient service.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

AFTER the budget till Easter the meetings of Parliament will be dominated by the financial aspect of affairs. But when Easter is over there are many large issues, including that of medical and food relief work in the immediate post-armistice period, to be considered. When asked about a debate on the massacre of Jews and others in occupied Europe the Prime Minister was sympathetic but counselled waiting until Mr. Eden returned from the USA, as he knows "exactly what is the latest position between the United Nations concerned." Mr. Law, under-secretary to the Foreign Office, gave some figures of refugees and massacred people. There were as refugees in this country some 176,000 people, excluding foreign nationals in the Armed Forces. Some 39,000 Jews had fled to Palestine and "above one million" was the figure given for Jews massacred in Poland.

Two days of Parliamentary time during the week were taken up by detailed committee amendments to the Catering Wages Bill. On the second day of the debate Sir Douglas Hacking, who with a number of Conservative supporters (originally over 100) had been using all the arts of opposition against the bill, said: "For two days we have tried to reason with the Government. It has taken twelve hours to discuss four clauses of the Bill." The formal opposition was then withdrawn. But an informal Conservative guerrilla movement still continued and mustered forty-two votes on the only division called. But, as the BBC says, the debate continued. And there are few things more wearying than detailed and sometimes finicky speeches on a matter on which the view of the House on the main principle is clear. Mr. Bevin had made his case. The bill is accepted as creating improved conditions for employees in the catering trades.

The weariness of the House had one astonishing and, I believe, unprecedented result. When at the end of the second day's debate the motion "To report progress" was moved, the assistant Serjeant-at-Arms approached the table in front of the Speaker where the Mace was lying on its two supports below the level of the table-top. It was his duty to lift it up from there and place it in position on the table-top, because this is the procedure when the Speaker is in the chair and "progress" must be reported from the "Committee" to him. But the assistant Serjeant-at-Arms put the Mace over his shoulder and marched towards the exit. This is the sign that the sitting has come to an end. But the sitting was not finished and there was the assistant Serjeant-at-Arms going off with the symbol of Parliamentary authority. Members gasped and shouted at him. But already the subordinate officers of the House had taken their cue and cried "Who goes home?" the old call with which all sittings end. It is rumoured even the acting Speaker uttered a sound resembling the expression "Hi!" And the assistant Serjeant returned, and nearly dropped the Mace on the table. The remaining business was soon dispatched, the sitting came to its legitimate end. The Mace was carried out and "Who goes home?" sounded out again. But the Mother of Parliaments had had a human lapse—she had got bored.

VITAL STATISTICS FOR ENGLAND AND WALES

The Registrar-General gives total live births in England and Wales during 1942 as 655,075 (some 68,000 more than in 1941) and total deaths (including those caused by enemy action) as 479,907 (some 55,000 less than in 1941). Birth-rates in 1941 and 1942 were 14·2 and 15·8 respectively, per 1000 population, and death-rates 12·9 and 11·6 respectively. The infant and maternal mortality-rates, set out in the following table, are the lowest recorded.

	1941	*1942*
Infant deaths per 1000 live births	59	49
Maternal deaths per 1000 live and still births—		
Post-abortive infection	0·35	0·35
Abortion without sepsis	0·19	0·11
Infection during childbirth and puerperium	0·47	0·42
Other maternal deaths	1·75	1·59

QUESTION TIME

Medical Relief for China

The Under Secretary for Foreign Affairs stated in answer to a question that HM Government have for long been fully aware of the urgent necessity of giving China all possible help in the way of medical relief, and have taken practical steps to do so, both by providing financial assistance and by the despatch of medical supplies. They have made a grant-in-aid of £50,000 to the British Fund for the Relief of Distress in China and a further £41,500 to the Chinese Red Cross. Apart from this, large sums have been collected by voluntary societies in this country, notably the United Aid to China Fund. Pending the reopening of the Burma Road, financial assistance of this kind must inevitably form the major part of the relief we are able to send to China, owing to the difficulties of transport. Every effort has been made to send medical supplies from India, and important allocations—e.g., 5 million tablets of quinine—have been made in the past. At the present time the shortage of medical supplies in India, in addition to the difficulties of transport, constitute serious limiting factors. HM Government are fully alive to the needs of the situation and will continue to do all that lies in their power to remedy it.

African Medical Service

Mr. R. W. SORENSEN asked the Secretary of State for the Colonies whether, in view of the discontent among Africans respecting the West African Medical Service, he was considering appropriate reforms; how many West African doctors had been appointed to the Colonial Medical Service operating in West Africa; how many West Africans hold responsible administrative medical posts in West Africa compared with Europeans; and whether the medical services in the West African Colonies were likely to be coördinated.—Colonel OLIVER STANLEY replied: Measures are under constant consideration for increasing opportunities for the employment of Africans as medical officers in West Africa. West Africans have not been formally included in the unified Colonial Medical Service. But 84 African medical officers have already been appointed to the West African Government services. So far, most of the senior medical administrative posts are held by Europeans, but the medical officer of health at Lagos and his assistant are Africans and a West African holds a specialist post in Nigeria. Measures to facilitate the interchangeability of African medical personnel among the four colonies are being considered.

Sir F. FREMANTLE: Has the Minister considered the advisability and the possibility of having a subordinate medical service, such as they have in India, where it has done most useful work?—Colonel STANLEY: That raises a bigger question.

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Aged Workers and NHI

I am aware that the men over 65 and women over 60, who have entered industry since the war began and who were not previously insured, are not entitled to medical benefit under the NHI acts, but it is not possible for such provision to be made within the present framework of the National Health Insurance scheme. (Mr. BROWN replying to Mr. J. J. TINKER.)

Artificial Limbs for Children

Sir JOCELYN LUCAS asked the Minister whether he could yet make any statement as to the advice to be issued to the maternity and child welfare authorities with regard to the provision of artificial limbs for children in need of them; and whether he would lay down that no child who lost a limb should be deprived of the right to an artificial one by reason of the inability of the parents to purchase one should it be recommended by the medical authorities.—Mr. BROWN replied: A circular, to be issued jointly by the President of the Board of Education and myself, is now being printed and will I hope be issued before the middle of the month. I have no power to require welfare authorities to supply artificial limbs but the circular will give approval to the exercise of their powers for this purpose.

Diphtheria

Among approximately 3,731,000 children immunised against diphtheria under local authority arrangements in England and Wales during 1940–42, the number of notified cases of the disease was 7286. The number of immunised children who died from diphtheria during 1942 was 41, as compared with 1473 deaths among non-immunised children. (Mr. BROWN replying to Mr. A. EDWARDS.)

Vaccine Lymph

Mr. S. P. VIANT asked the Minister the reason for the change made in the number of live bacteria allowed in vaccine lymph; was a more potent lymph needed; and what safeguards were furnished for the protection of the public against the effects of lymph containing such large numbers of living bacteria.—Mr. BROWN replied: The change has been made to facilitate production of vaccine lymph, not to increase its potency. The increase of bacteria mentioned relates to harmless adventitious organisms found in lymph as taken from the calf, and the last part of the question, therefore, does not arise. The safeguards against harmful micro-organisms remain as stringent as they have always been.

Infectious Disease in England and Wales

WEEK ENDED MARCH 27

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2185; whooping-cough, 1982; diphtheria, 816; paratyphoid, 1; typhoid, 6; measles (excluding rubella), 19,561; pneumonia (primary or influenzal), 1505; puerperal pyrexia, 191; cerebrospinal fever, 101; poliomyelitis, 4; polio-encephalitis, 1; encephalitis lethargica, 1; dysentery, 92; ophthalmia neonatorum, 96. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on March 24 was 2354, including scarlet fever, 528; diphtheria, 245; measles, 783; whooping-cough, 301; enteritis, 89; chickenpox, 57; erysipelas, 5; mumps, 18; poliomyelitis, 2; dysentery, 32; cerebrospinal fever, 16; puerperal sepsis, 15; enteric fevers, 8; german measles, 25; encephalitis lethargica, 1.

Deaths.—In 126 great towns there were no deaths from enteric fever, 4 (0) from scarlet fever, 18 (6) from measles, 19 (1) from whooping-cough, 21 (2) from diphtheria, 56 (5) from diarrhœa and enteritis under two years, and 73 (7) from influenza. The figures in parentheses are those for London itself.

There were 3 deaths from diphtheria at Manchester. Birmingham reported 7 fatal cases of diarrhœa. Sheffield had 7 deaths from influenza, no other great town more than 4.

The number of stillbirths notified during the week was 252 (corresponding to a rate of 38 per thousand total births), including 19 in London.

DIPHTHERIA IN EIRE.—There has been a serious incidence of diphtheria in Dublin in recent weeks. During the four weeks ended March 27, 131 cases have been notified in the county borough. The cases are mainly of the severe type classed as *gravis*, and there have been many deaths. The incidence in Cork has also been high, 40 cases having been notified during the same period.

Letters to the Editor

EVALUATION OF GASTROSCOPY

SIR,—There are two special matters in Dr. Morton Gill's article of March 13 to which attention may be called. First it is stated that the findings are analysed in "1000 consecutive gastroscopic examinations," but no indication is given as to what cases are selected for gastroscopy or indeed that there is any selection at all. We may accept it that they are from the gastric clinic but they must be further selected since the analysis gives only 5·3% as having ulcers, mostly positive to X rays. One would expect either a far higher figure for ulcers or none at all if a positive X ray is the criterion for exclusion. Probably the cases approximately correspond with what may be called "non-ulcer dyspepsia." Normals are recorded as only 36·6% even though this apparently includes a block of 60 cases from group A, in which "both X ray and gastroscopy revealed a gastric lesion." But gastritis is found in over 49%, a surprisingly high figure.

The second point is the following statement: "Most superficial and hypertrophic types [of gastritis] are not sufficiently serious to incapacitate, and a soldier can be retained in a low medical category without hospital treatment." On this basis over 50% of non-ulcer cases gastroscoped would be placed in category C. Some other cases of gastritis would be discharged and only some 30% of cases would return to their units in category A or B. It needs little experience of the Army to recognise that a man who has been in hospital for dyspepsia, has been investigated and gastroscoped, and then placed in category C is unlikely to be of use as a soldier, and it is the belief of the Army that a far higher proportion of non-ulcer dyspepsias can make useful soldiers. If Dr. Gill's conclusion is put into practice a large number of men will be lost to the Army, I would suggest unnecessarily. Dr. Gill can, no doubt, supply the evidence on which his statement is based. Until this is published and confirmed it would be contrary to public interest for medical boards to act in accordance with this opinion.

London, W.1. HENRY L. TIDY.

SIR,—Dr. Gill's figures are so much at variance with my own experience of gastroscopy among both Service and civilian patients that I feel some comment on them is called for.

Dr. Gill finds that nearly half the patients (396 of 806) had gastritis, and that only 295 (36·6%) were normal. My records of many hundreds of gastroscopies at King's College Hospital and elsewhere in civilian practice have been destroyed, but I know that the incidence of gastritis—or what I took to be gastritis—was not nearly so high, and this despite the fact that there was no upward limit to the age-group as there is among soldiers. In military work I have records of gastroscopies in 86 soldiers—who were a specially selected group from 346 patients in whom radiological evidence of disease was in doubt or was negative, and in whom I thought there to be some clinical evidence of a lesion of the stomach. In these selected cases I found evidence of gastritis only in 23—that is, in about a quarter. This is so much at variance with Dr. Gill's figures that either: his 1000 cases were more carefully selected than were mine (though there is no reference to this selection in the text of his article, and neither does the very large number of cases suggest any such selection); or his diagnostic criteria at gastroscopy differ from mine.

I am astonished at the high proportion of cases diagnosed gastroscopically as hypertrophic gastritis (166) and, to a less extent, at the comparatively large number of cases (34) of atrophic gastritis. Dr. Gill, referring to hypertrophic gastritis, says "Most . . . hypertrophic types are not sufficiently serious to incapacitate, and a soldier can be retained in a low medical category without hospital treatment." My experience of hypertrophic gastritis is that it is a rare and serious lesion—especially rare in the young man, and serious in that it is a progressive lesion, and a likely precursor of cancer. Of the 23 cases of gastritis diagnosed among soldiers, 18 were superficial and 5 hypertrophic. Of these 5, 2 were sufficiently advanced for radiological

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diagnosis, and were in men aged 41 and 43; 2 were radiologically negative, and one was diagnosed radiologically as duodenitis.

As regards the 34 examples of atrophic gastritis, I feel the term atrophic should be amplified. Under this heading I can think of at least four different conditions familiar to me as a result chiefly of civilian work.

(*a*) The thin pale mucosa, through which blood-vessels can be seen, associated with hypochlorhydria. This is the most common perhaps. The condition is a constitutional one, and I do not think it should be labelled "gastritis." Its significance with regard to the patient's gastric future is unknown, and there is no treatment for it, as far as I know.

(*b*) The pale mucosa, with complete achlorhydria, and an alteration in the blood-picture—a rare condition in men, particularly young men.

(*c*) A progressive and destructive type in which the mucosa is patchily affected, and has a characteristic greenish colour.

(*d*) A condition, probably allied to (*c*), in which superficial, hypertrophic and atrophic gastritis is present simultaneously. I have seen this condition several times in older patients, and in 2 cases gastroscoped at the EMS hospital at Leatherhead. Both were in young sailors, who had suffered great hardships on constant minesweeping patrols in the North Sea.

I am a little surprised that in all these cases of gastritis Dr. Gill has seen no mention is made of this mixed type, and that he has been able to fit every one into the three groups—superficial, hypertrophic and atrophic. I have always held that these three divisions were purely arbitrary, and a reasonable classification until the time when more is known: but gastroscopic experience shows it to be an inadequate grouping, and that there is often a good deal of overlapping.

Finally, the management and disposal in the case of the soldier is extremely important. I agree that a routine investigation should be done in all cases of dyspepsia if the doctor is sufficiently convinced by clinical examination that there is something organically wrong. If investigation shows an ulcer or a severe diffuse lesion of the stomach, the patient should be recommended for discharge from the Army. It is, however, very important to avoid placing a man in a low category for a doubtful gastric lesion, for experience has shown that such a patient is forever labelled a "gastric" case; he develops a "gastric" fixation and can use his supposed disability forever to avoid any unpleasant duties the Army may call upon him to perform. According to Dr. Gill's policy only 295 of 806 dyspeptics would return to their unit. Something like 360 patients diagnosed as chronic gastritis would be put in a low medical category (degree unspecified): and this is in one clinic alone. Suppose such a policy were followed in every EMS and military hospital in the country, what would be the effect upon man power?

After many years' experience of gastroscopy, I am convinced of its value in both civilian and military work—who is not?—but I feel that if by gastroscopy we sort out vast numbers of cases in the Army because their stomachs do not appear to be quite normal, and put them into low categories, then the gastroscopist is perhaps guilty of a disservice.

Southern Command. HAROLD C. EDWARDS.

PREFRONTAL LEUCOTOMY

SIR,—Dr. Fleming and Mr. McKissock have described 15 cases treated by prefrontal leucotomy and Dr. Hutton 50 cases. It is precisely because their work is of a high order that I take this opportunity of drawing attention to the special objection that is easily felt to the treatment of mental disorder by any method that leaves a permanent physical deficiency or deformity of the brain, even if favourable results can be shown to follow in certain cases.

The theory that schizophrenia, manic-depression, psychosis and melancholia are diseases with physical basis is still held by some; but the alternative theory that these mental diseases are disorders of emotional development (with varying degrees of hereditary factor) has not been disproved. I suggest that until this latter theory has been disproved, it is a very serious matter indeed for a doctor to subject patients to an operation in which the actual tissues of the brain are cut. It is for those who wish to try to cure mental disorder by operative measures, or by the induction of fits, first to prove that the insanities are actually brain-tissue diseases.

I hold the view that ordinary insanity is a condition closely allied to genius and special talent and to personality of exceptional value, and naturally therefore I feel disturbed when I hear of treatments which absolutely preclude full recovery, even if these treatments can be shown to cause a shift towards sanity in a proportion of cases.

Moreover, it is a very great help to people with mental difficulties for them to be able to contemplate or even to have a period of breakdown. The idea of the voluntary patient seems to me to be partly built on this rock. But the public is getting to know that a breakdown will mean a course of fits, or perhaps a permanent deformity of the brain, and I think this is not the sort of thing to encourage that early report of symptoms which is rightly sought by those who treat the psychoses.

Queen Anne Street, London, W.1. D. W. WINNICOTT.

TRAINED NUTRITIONISTS

SIR,—Your review of the Glasstones' *The Food You Eat* sets one thinking. Here is the United States, much better fed than we and probably 20 years ahead of us in their knowledge and practice of sound feeding, apparently ready to absorb yet another large book on diet for the layman—a book sponsored by a university press and written by a professor of chemistry and his botanist wife, graduates of English universities. If there still is need for lay education in nutrition in the USA, how much more so here! The main needs in Great Britain in nutrition seem to me to be twofold: the production of nutritionists (to use the American term), and the education of the public. The nutritionist, as distinct from the hospital dietitian, is one whose training fits her to undertake dietary surveys, to carry out much of the technical work for the organisers of nutritional surveys, and to aid medical officers of local authorities in the many aspects of their work which entail a sound up-to-date knowledge of dietetics—e.g., the feeding of school-children, maternal and infant welfare, tuberculosis clinics, outpatient clinics.

What is the present state of affairs here? Nutritional research in Great Britain is second to none. We have the men though we have not always "the money too." What we have not got is nutritionists. We have a number of hospital dietitians, it is true, but the training these get by no means fits them to be nutritionists. Anyone can set up as a dietitian. Domestic science plus "doing time" in a hospital diet kitchen seem to constitute one a dietitian, and so far the British Dietetics Association has done nothing to standardise requirements. It is not easy off-hand to sketch a training for a nutritionist or social dietitian. It must be fundamentally scientific, based on a knowledge of chemistry and physiology. (I should prefer one of these subjects to have been studied at special honours standard.) The theoretical dietetics must be treated as a special honours subject, as critically as possible, for critical faculty and flexibility of mind are essential in a subject which grows so rapidly and so frequently discovers its premises to have been mistaken. Statistics applied to biological problems would be needed and the practical work should be partly academic and partly social: biochemical and biophysical methods of assaying the state of nutrition, practice in making dietary surveys, assessing the food values of restaurant meals, canteens, &c., follow-up work in maternal and infant welfare and tuberculosis clinics.

The work envisaged for such trained nutritionists is (i) aiding the organisers of nutrition surveys on the technical side, (ii) carrying out diet surveys for the Ministry of Health or local authorities, (iii) educating the public through those who come into closest contact with people in the home—the district nurse, the welfare worker, the sanitary inspector and the domestic science teacher. One of their jobs would be running the food advice bureaus. Those people at present get their knowledge of diabetics from the women's column of the daily press, the patent food advertisements, or even from their inner consciousness only; it should be one of the tasks of a nutritionist attached to a local authority

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to give them "refresher courses" in dietetics so that what they hand on to the public is up to date.

Quite rightly the Nuffield Foundation puts nutrition on the list of subjects to be encouraged. There is need for the advancement of our knowledge in nutrition. But there is at least as great a need for the education of the lay public in the facts of nutrition. It is not much use finding out what people ought to eat if there is no satisfactory way of letting them know about it. Few people pay attention to advertisements or pamphlets, even from the Ministry of Food, believing them to be tendencious. The wireless might help and the radio doctor's weekly five-minutes must have done good. But these are not enough, for the only people who can be really effective are those who get right into the homes. To do this and to keep those public-health officials who come into direct contact with the people au fait with the advances of dietetics we need trained nutritionists. They have them in the United States and Canada. Why not here?

University College, Leicester. V. H. MOTTRAM.

FOOD STANDARDS

SIR,—It is a matter for satisfaction that Sir William Beveridge has, in his report, recognised the principle that quantitative standards based on scientific knowledge may, and should, be applied to the measurement of minimum human requirements in food, fuel, light and clothing. As medical knowledge advances, and as cultural demands change, any standards of this nature will be gradually modified, though there can be no doubt that those for food have now been determined with a fair degree of scientific accuracy. We would express our conviction that the food standards now proposed for this country, based as they are on the scales laid down by the British Medical Association and the League of Nations Technical Commission, accord with the opinion of all accredited scientific workers in this particular field. It is not our business to decide what shall be the actual scales of cash benefit and allowance under any system of social security. That decision rests with the people of this country and with their elected representatives. But we do urge that all such scales shall, in future, be related immediately to the scientifically estimated needs of each type of beneficiary.

JOSEPH BARCROFT. CHARLES MARTIN.
STANLEY DAVIDSON. ROBERT MCCARRISON.
F. GOWLAND HOPKINS. MORAN OF MANTON.
HORDER. SEEBOHM ROWNTREE.
JULIAN HUXLEY. J. C. SPENCE.
J. M. MACKINTOSH. W. H. WYNN.

DEATH TO THE LOUSE

SIR,—In your annotation of March 27 you rightly draw attention to the great advances which have been made, particularly by Busvine and Buxton, in producing substances of value against head lice. With these medicaments it should no longer be impossible to rid large sections of the population completely from their widespread infestation with head lice. Lethane 384 special is, as you mention, equally efficacious against the body louse but considerable caution should be exercised before using it in the way you mention (i.e. that the infested person should be swabbed down with 40% lethane). This strength of the lethane is quite safe for use on the scalp, but in my opinion it would be dangerous to use at all widely for complete applications all over the body. In some experiments by my colleagues and myself on the use of lethane in the treatment of scabies (it is much less efficacious against this disease than it is against the louse) we found that any strength greater than 5% caused considerable discomfort when applied all over the body, and on one occasion, where by accident a 50% solution was used, the patient suffered considerable agony (Mellanby, K., Johnson, C. G. and Bartley, W. C. *Brit. med. J.* 1942, ii, 1). It may be that risks of this kind would be justified in a typhus epidemic but I feel that we already have other methods available which would kill off body lice with less discomfort to the patient.

Sorby Research Institute, Sheffield. KENNETH MELLANBY.

PREVENTION OF VENEREAL DISEASE

SIR,—Everything advocated by the opponents of scientific prevention has had many centuries of trial and effort, and the result is ignominious failure. Venereal diseases still flourish because people with opinions like those of Professor Ryle have been able, up to the present, to prevent the prevention of VD. Everyone will join in wishing success to all the indirect efforts—moral, religious, social, educational and economic—that can be brought to bear upon the problem, but the fact remains that despite all the energy and the clamour that has been devoted to the subject, the result is failure. Venereal disease continues to increase.

On the medical and scientific side there are two important lines of direct attack—i.e., treatment and prevention. Both of these are the results of brilliant investigation and research.

(1) The treatment of these diseases has reached a high degree of efficiency and success. Everyone agrees that all who have contracted the disease, whether innocently or otherwise, must have full advantage of the most up-to-date treatment. In fact, those who are most violently opposed to scientific prevention are demanding increased facilities for treatment. Such treatment is prolonged, is very costly, and although it is very successful it cannot claim to make the patient "as good as new."

(2) The brilliant researches of Metchnikoff and Roux in 1905–07 gave to humanity the means of preventing syphilis, and experience during the last war evolved a technique which undoubtedly is effective in preventing both syphilis and gonorrhœa. My experience as a VD officer in the Army in the last war proved to me that where these measures of scientific prevention are practised VD disappears. These foul diseases are therefore at our mercy, but they are kept thriving amongst us by the deliberate suppression of knowledge about prevention.

Overwhelming evidence about the efficiency of prophylactic methods was given before the Trevethin Committee in 1922 by myself and many other witnesses, and it is abundantly clear that these diseases await extermination by any nation sufficiently enlightened to apply the gifts of science and experience. Nothing but what one of your correspondents (of March 13) describes as "prudery, hypocrisy and cant" stands in the way, but it is evident that the opponents of prophylaxis do not wish to destroy these diseases. They talk glibly about "the education of the people" but they fight grimly to prevent the public knowing the very simple facts about prevention. The officially sponsored *Plain Facts about VD* omits the most important fact of all—namely, that VD is easily preventable. Entire responsibility for the widespread incidence of VD rests upon those who oppose prevention.

Fortunately some local authorities are launching crusades against VD on more enlightened principles. In Bournemouth, for example, hundreds of the effective poster issued by the National Society for the Prevention of Venereal Disease (47 Devonshire Place, W1), have been displayed. These posters invite applications from men and women for cards containing simple directions about prevention. Thousands of these cards have been issued.

R. A. LYSTER,
Bournemouth. Chairman of NSPVD.

WOMEN MEDICAL GRADUATES AND THEIR SCHOOLS

SIR,—Recently it was my duty to gather together information about the qualifications and work of all the medical women in certain counties of Britain, and from that I turned to classifying women graduates according to the decades in which they had graduated and where they had sought and obtained their qualifications. Finally I went through the Medical Register of 1941 and made the enclosed table. It shows in which decade, and where, all the medical women alive in 1940, who had obtained British qualifications, were trained. They constitute the majority of a group by whose efforts women have become established in the practice of medicine within the British Commonwealth in the past half-century. They are of course of many nations and numbers of them live abroad permanently. The figures are not exactly correct, small errors and omissions are

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certainly present; doubt about the gender of a few Christian names (particularly foreign names) is responsible for some of them.

The table will, I think, be specially interesting to the senior medical women among your readers who can look back thirty, forty or more years and in whose memories alone are the details which can put colour into an unadoned table. Two points emerge from the data: first, that the weight of this educational enterprise has been borne by four great institutions—namely, the universities of London, Glasgow and Edinburgh and the Royal Colleges in England; second, that there was a very large falling off in the numbers of women medical students in the decade 1931–1940 compared with the decade 1921–1930.

Edinburgh. H. RUSSELL.

DISTRIBUTION OF WOMEN GRADUATES IN MEDICINE AMONG THE BRITISH UNIVERSITIES

Based on the Medical Register of 1941

Decades ..	1871–1880	1881–1890	1891–1900	1901–1910	1911–1920	1921–1930	1931–1940	Total
ENGLAND AND WALES								
BIRMINGHAM University	..	..	..	4	18	75	59	156
BRISTOL University	..	..	..	..	6	34	45	85
CAMBRIDGE University	..	..	..	..	..	16	40	56
DURHAM University	..	..	5	24	26	71	67	193
LEEDS University	..	..	..	..	7	56	42	105
LIVERPOOL University	..	..	..	..	21	100	83	204
LONDON University	..	5	54	134	104	518	311	1126
ENGLISH Conjoint	..	..	3	3	139	567	454	1166
LONDON Apoth. Soc.	..	1	14	19	19	28	34	115
MANCHESTER University	..	..	..	9	42	115	75	241
OXFORD University	..	..	..	..	..	21	19	40
SHEFFIELD University	..	..	..	..	6	34	13	53
WALES University	..	..	..	..	..	14	33	47
IRELAND								
BELFAST Queen's Univ.	..	..	..	..	33	168	90	291
DUBLIN University	..	..	..	2	31	80	68	181
IRELAND Royal Univ.	..	..	11	14	..	..	..	25
IRELAND National Univ.	..	..	1	3	51	201	61	317
IRISH Conjoint	1	2	4	12	11	58	53	141
SCOTLAND								
ABERDEEN University	..	..	1	11	46	145	93	296
EDINBURGH University	..	..	17	109	144	392	226	888
GLASGOW University	..	..	41	75	162	412	212	902
ST. ANDREWS University	..	..	..	11	37	96	75	219
SCOTTISH Conjoint	..	16	84	44	27	65	92	328
Totals for each decade ..	1	24	235	474	930	3266	2245	7175

Total number of doctors registered in Britain in 1940 = 59,080

Average number added to the register each year for the last 20 years .. .. = 1777

STERILITY

SIR,—The timely article in your issue of March 20 merits widespread interest. Two points, however, need comment. First, the statement that "the most likely time for conception is some 10–14 days after a period" may lead to errors in calculation; had you said "10–14 days after the *first* day of a period in regularly menstruating women" the meaning would have been clearer. Secondly, with regard to the suggestion that "the husband, not the wife, should be examined first," would it not be sounder to say: "in the full investigation of sterile marriage the husband and wife should be examined conjointly whenever possible"? In these days of absent husbands much valuable time may be wasted if one waits for the next leave before starting the investigation of a couple, and useful ground can be covered and simple difficulties often cleared away by a preliminary interview with the wife. One thing more should perhaps have been emphasised: however many workers may be concerned with the special examinations, one doctor should be responsible for coördinating and keeping under review the results of investigation and the treatment of the couple as a unit.

You make an excellent point in suggesting that advice on involuntary sterility, suitability for marriage and contraception (and, one might add, marital difficulties) should ideally be given under one roof at what you call "marriage clinics." This is already an established practice in Scandinavia, in USSR and to a certain extent in America, and a start has been made on these lines under the ægis of the Family Planning Association in this country. In one such clinic a fairly complete sterility service has been in existence for some time. The local doctors apparently find it a convenience to have such a place to which they can refer cases; the consultants and scientific workers at a nearby university are more than generous in coöperating and giving specialised knowledge and advice; and the patients on the whole find the environment somewhat less alarming and more homely than a hospital. Moreover, a clinic of this sort has access to large numbers of highly fertile couples which provide invaluable opportunities for the making of much-needed observations on the factors concerned with superfertility, which should materially aid the solution of some of the problems associated with subfertility. It is hoped that more birth-control clinics will establish a service for helping couples who want but cannot get children. What is urgently needed is a central body of experts to direct and coördinate the efforts of workers at local clinics, and no doubt a move will be made in this direction in the near future.

Crediton, Devon. MARGARET HADLEY JACKSON.

THE NEUROTIC EX-SOLDIER

SIR,—I am in complete agreement with Dr. Ling's letter of March 13 and his suggestion for the solution of the placing of the neurotic ex-soldier. I can fully substantiate what he says about the position of this type of ex-Service man in industry, and it has caused me a considerable amount of thought, and, I must say, condemnation of the methods of handling these disabled men. For over a period of 18 months I have interviewed, and passed into an engineering factory, a considerable number of ex-Service men who have been discharged from the Services as a result of some psychopathic condition, and I have watched many of them making valiant efforts to compete with their fellow workers on something like even terms.

A number of them have succeeded in adjusting themselves for a period up to 12 months, but most of them show signs of breaking down between 4 and 6 months. I felt it was the long hours and the night duty, plus the methods of payment—e.g., production bonus—that eventually precipitated a collapse, and it often became necessary to relieve them of night duty and overtime to keep them going. This naturally reduced their earnings in competition with their fellow workers, and they became more depressed and self-pitiful, and often asked to be released in order to take up work where the production drive was not so intense. These releases in turn caused dislocation in the shops where skilled men were working, and I reluctantly concluded that these men should be placed on work where fewer hours and occasional absence would not cause disorganisation of production; such work, naturally being of a semi-skilled nature, did not satisfy them, and this produced a feeling of frustration and inferiority which reacted extremely badly on their mental outlook.

Dr. Ling's suggestion of establishing resident training centres under the Ministry of Labour, where these men could be rehabilitated without disorganising industry, will I feel sure be acceptable not only to the medical profession but to the country itself.

INDUSTRIAL MO.

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USE OF CURARE FOR DIRECT ORAL INTUBATION

SIR,—Your annotation of Feb. 27 (p. 274) refers to the similarity between the symptoms of myasthenia gravis and curare poisoning. My own experience may be interesting. While reading of the "softening" of convulsions in leptazol shock therapy by 'Intocostrin' (the Squibb preparation of curare) it occurred to me that if the intravenous injection of this drug relaxed the jaw muscles, it might be useful for oral intubation by direct laryngoscopy. To investigate this, Dr. Geraldine Paul and Dr. Margaret Kemsley kindly injected me with 4·4 c.cm. of intocostrin intravenously. My sensations were dramatic. I feel that I experienced the sufferings of a patient with myasthenia gravis. At once my vision became blurred and almost "blacked out"; then came diplopia, which persisted for two hours, except when a great effort to concentrate was made. Ptosis was also very oppressive, and was accompanied by extreme prostration, fatigue, a sense of impending death, and a transient sensation of constriction in the throat. Sixteen minutes later, an attempt to sit up caused vertigo, relieved by closing the eyes. Mentality appeared normal throughout. Next day I felt fatigued but was able to work. It was noticed that my colour was pale and rather grey. Pulse-rate, starting at 100, did not vary beyond 96–100 per min. Blood-pressure, starting at 130/76 did not vary beyond 125/80 and 138/80 mm. Hg. Respiration showed slight increase in rate, and was rather shallow and abdominal in type. There was extreme ptosis, lasting for two hours, eyeball movements and knee-jerks were normal. These signs were at their maximum after two minutes, and began to pass off after seven. The jaw muscles were well relaxed, and it was possible to see the vocal cords with a laryngoscope.

Since this, I have orally intubated five patients, obtaining the necessary jaw relaxation with 5 c.cm. of intocostrin (intravenous) given when they were lightly anæsthetised with nitrous oxide and oxygen, ether, or 'Penthothal,' the larynx being sprayed in each case with 10% cocaine. None of these patients showed any significant variation in pulse-rate or blood-pressure, but a boy of seventeen, for whom I think the dose was too large, had rather shallow, inefficient respiration ten minutes after injection, but after inflation with oxygen gave no further anxiety. In all cases respiration was very quiet and abdominal in type, and less anæsthetic than usual was required; there was no vomiting, and the postoperative condition was unusually satisfactory.

I should like to thank Drs. Paul and Kemsley for their assistance, and Messrs. Squibb for their gift of intocostrin.

Devonshire Street, W.1. HELEN BARNES.

MEAT OR BEANS?

SIR,—Justice has not been done to the haricot bean in the review of *Food, Health, Vitamins* in your issue of Jan. 30. When comparing its protein with that of beefsteak you quote the figures of McCance and Widdowson to show that stewed beefsteak contains about 4½ times as much protein as boiled haricots. Values thus calculated for foods as consumed without taking into account their relative water contents may be grossly inaccurate. The protein value of milk, for instance, if calculated on such a basis would be only a ninth of that of stewed beefsteak. The results of nutritional surveys indicate that the most accurate basis for calculating food values is one which takes into account energy values. Since we normally consume more of a low energy value food in order to make up our quota of calories, the other food values should be calculated in inverse ratio to the energy values. This method of calculation has recently been introduced in the American medical press, and will no doubt be adopted here later. On this basis, using the further data of McCance and Widdowson, since their boiled haricots had been diluted with water to a calorie value less than half that of their stewed beefsteak, the true protein value of the beefsteak as consumed is not 4½ times but only about twice that of the beefsteak. If the protein values were calculated on an economic basis (i.e. on food, as purchased) then Plimmer's statement that the protein value of beans is equal to that of lean beef is substantially correct.

It is to be hoped that this correction will help to justify the action of those who by eating home-grown haricots instead of imported beefsteak are attempting to set free more of the fast meat-carrying ships which the Minister of Food has told us will soon be needed for more important purposes.

Ovaltine Research Laboratories. FRANK WOKES.

MASKED HYPERTHYROIDISM

SIR,—I was much interested in the editorial in your issue of Oct. 31 last year. With most of this I find myself in agreement. With regard to your reference to the simulation of progressive muscular atrophy by Graves's disease, I may draw to your attention the paper by Ayer, Lerman and myself which appeared in 1934 on this subject,[1] because it antedates the work which you cite.

I certainly agree that the picture of Graves's disease is a composite one, and that there are several main groups of symptoms. I think the chief subdivision should be between the thyrotoxic and the ophthalmic. I do not look upon the nervous group as of the same rank as these two, nor am I certain that a nervous disorder without any increased metabolism or ophthalmic manifestations could be called Graves's disease.

An important diagnostic item which you do not mention is the response to iodine, which I think occurs in any case of true Graves's disease, even though the metabolic rate be not elevated above standard to start with.[2]

J. H. MEANS.

URETHRAL DILATATION IN ENURESIS

SIR,—The following case may be of interest to readers of Mr. H. P. Winsbury-White's paper on this subject (*Lancet*, 1941, ii, 331).

A boy now aged 11, born in the British Isles, was circumcised at the age of 1 month. From 1932 to 1939 he spent his winters in India and his summers in Britain. He was healthy but constipated. He could not be trained to hold his urine at night though there was never any difficulty during the day; he seemed to pass more at night than in the daytime.

In 1934 and 1935 he was tried on small doses of thyroid, without effect. Since 1934 he has been subject to attacks of fever and vomiting if given much fat in the diet; during these attacks he has frequency but no pus cells have been found in the urine; no cultures have been made. He became sensitive about the enuresis, and tried to hide the fact from people In 1937 ephedrine was given by mouth, and though th. controlled the enuresis it had to be given up because it made him too restless at night. Other forms of treatment, based on suggestion, failed.

In January, 1940, Mr. Winsbury-White carried out cystoscopy and urethroscopy, and dilated the posterior urethra. The patient remained dry at night for about a fortnight, and then relapsed. In February, 1940, Mr. Winsbury-White gave him a second treatment, since which he has been cured except for some half-dozen occasions when under special stress he has wet the bed.

Raipur, C.P., India. R. F. W. K. ALLEN.

1. Simulation of Progressive Muscular Atrophy by Exophthalmic Goiter. By J. B. Ayer, J. H. Means, and W. Lerman. *Endocrinology*, 1934, 18, 701.
2. Graves' Disease with Dissociation of Thyrotoxicosis and Ophthalmopathy. By J. H. Means, S. Hertz, and R. H. Williams. *Trans. Ass. Amer. Phys.* 1941, 56, 67. The Eye Problems in Graves' Disease. By J. H. Means. *Illinois med. J.* 1941, 80, 135.

A PSYCHIATRIC CLINIC IN NEED.—New patients increased at the Liverpool Psychiatric Clinic in 1942, and the total attendances numbered 1124. The increase in delinquency has moved the staff to study specially the needs of children and young people and they have done all they can to meet the demand for advice on such cases; the annual report notes that, during 1942, 75 boys and 53 girls were treated: but it is estimated that for every case investigated 100 equally serious had to be neglected. The clinic is now twenty years old and is maintained by subscriptions and donations, fees from contributory schemes and contributions from the patients themselves. Yet in spite of the efforts of generous friends the modest expenditure of £333 on the year's work was not covered by the receipts. It is unfortunate that the clinic, which is evidently meeting a real need, should be driven to drastic economy.

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Obituary

THOMAS EDWIN HAMMOND
FRCS

Mr. T. E. Hammond, surgeon and consulting urologist to the Cardiff Royal Infirmary, died in a Northampton hospital on March 25 at the age of 55. He was born at Penrhiwfer, the son of Edwin Hammond, colliery proprietor, and educated at Cheltenham College and St. Bartholomew's Hospital where he qualified in 1912. He took his surgical fellowship shortly before the last war, and though he had never been strong, and was indeed dogged by ill health all his life, he spent the next four years in the RAMC and was wounded in the Dardanelles campaign.

A. W. S. writes: "His first bent was to orthopædics, and he was for a time a surgeon at Alder Hey Hospital, but when he started as a consulting surgeon in Cardiff he took up urological surgery. He was one of the earliest assistants in the surgical unit of the Welsh medical school, and in due course was appointed to the infirmary staff, where he was a full surgeon at the time of his death. He attained great proficiency in his speciality and at one time was president of the urological section of the Royal Society of Medicine. His large practice was proof of his colleagues' appreciation of his work."

Hammond had a restless and inquiring mind, and the problem of infection as he saw it in the urinary tract led him to review in his own way the mechanism of inflammation. Between 1934 and 1936 he published four considerable books on various aspects of the theme. He came to the conclusion that the individual constitution was more potent in determining the reaction to infection than the nature of the invading organism. Most of the drugs used in medicine owed their efficacy, he held, to their stimulation of the defensive mechanism rather than to any direct antibacterial action. He was appalled at the disregard of orthodox medicine for idiosyncrasy and came to postulate the existence of special centres of life and energy in the basal ganglia. While he scarcely expected others to accept his tentative conclusions, he lived to see a reaction from the narrow bacterial conception of disease.

CHARLOTTE ELIZABETH FERGUSON-DAVIE
OBE, MD LOND

Mrs. Ferguson-Davie, who died at Port Elizabeth on March 24, was one of the pioneer medical missionaries of the Society for the Propagation of the Gospel. She was the daughter of the late Prof. Edward Hull, FRS, and after qualifying from the London School of Medicine for Women in 1895 she sailed for India, where she worked at Delhi and later at Ranchi. In 1902 she married Charles Ferguson-Davie, and when in 1909 he was appointed bishop of Singapore she continued her work in that city, to begin with under conditions of extreme difficulty, in three separate centres whose buildings were quite inadequate for the needs of the people. For some years Mrs. Ferguson-Davie worked untiringly to collect funds to build a hospital, and in 1923 the St. Andrew's Hospital with accommodation for sixty inpatients was opened. The work developed quickly, and soon many thousands of women and children were treated every year. In 1927, when her husband retired, Mrs. Ferguson-Davie left Singapore and accompanied him to South Africa where she took an active part in medical missionary work wherever they were stationed.

ALICE KER
MD BERNE, L R C P I & E

Alice Jane Shannan Ker, who died on March 20 at her home in North London, in her 90th year, was the thirteenth woman to get on the Medical Register in this country. She qualified in Dublin in 1879 and the following year took her MD in Berne. After residence at the Birmingham Children's Hospital she practised in Edinburgh and added a further diploma. There in 1888 she met her husband and went to live at Birkenhead, practising (the only woman doctor) among women and children until 1914. She was also medical officer to the Post Office and to the Lying-in Hospital as it then was. The onset of the last war brought her back from retirement and she took up school clinic and infant welfare work, beginning at St. George's Dispensary and the Blackfriars Clinic. Later she did similar work at Chorley Wood, retiring finally at the age of 73 when she spent some time in the USA. She was the author of a popular book on *Motherhood*.

Notes and News

CARE AFTER MENTAL BREAKDOWN

THE tuberculous and the mental patient are alike in that both need some help to tide them over, after leaving hospital, until they are fit to begin work again. The mental patient is fortunate in having the interest of the Mental After-care Association, a voluntary body whose sixty-third annual report is a record of steadily growing work. During 1942, 2509 patients were helped, as compared with 2206 in 1941. Some were sent to the convalescent homes maintained by the association, others were boarded out either singly or in groups of two or three. Many have been visited in their homes, and no less than 113 have been found work, though the employment office of the association has been hampered in its efforts by war conditions. Occupational therapy has always been provided as freely as possible at the homes; one superintendent has overcome the difficulty of obtaining materials by getting a local factory to teach him some semi-skilled processes with light and portable material, and then to send material to the home so that he could teach the patients to do the work. The finished work sent back to the factory by the patients has exceeded the firm's expectations in accuracy and quantity, and the patients have responded well to the thought that they were doing something useful for the nation. The report notes growing friendly relations with hospital almoners—a link between the curative and aftercare services which must inevitably benefit the patient. As the only charity of this kind in the United Kingdom, the association is in constant need of help to carry on and extend its work. Those who wish to know more of it should get into touch with Miss H. S. Russell, the secretary, at Eagle House, 110, Jermyn Street, London, S.W.1.

PRECEPTS OF HEALTH

SELDOM has so much common sense been issued to the public by a Ministry as in a booklet[1] just published. There is, of course, nothing new in its ten golden rules for healthy living; but how often is the busy practitioner able to inculcate them personally into his patients? In the rush of practice it is always easier to prescribe an aperient or a tonic and hope for the best, than to try and reorientate the patient's attitude to health. In this task *How to Keep Well in Wartime* gives valuable aid. Dr. Hugh Clegg, its author, has a direct and disarming style, and does not write down to a lay reader. Doctors and hospitals should have plenty of copies of this pamphlet handy, and should advise patients to buy a copy for themselves.

AMERICAN CONSULTANTS

THE complete American Medical Directory is of brobdingnagian proportions and, of necessity, terse in its entries. The English reader, accustomed to the more spacious manner of our own directory, will accordingly welcome the *American Directory of Medical Specialists* which, by European standards, is a handier size, yet manages to be reasonably informative. The first edition was published in 1939, and the second,[2] which appeared at the end of last year, is bigger and better. It contains the names of over 18,000 "certified diplomates"—more than 4000 up on last time—and the biographical information given about each has been made more complete. Each of the fifteen specialist boards has its own section, where the entries of its members are arranged geographically state by state, while at the end of the book an alphabetical list of diplomates with their addresses and specialties serves as an index.

1. How to Keep Well in Wartime. Issued for the Ministry of Health by the Ministry of Information. London: HM Stationery Office. Pp. 24. 3d.
2. New York: Columbia University Press; London: Humphrey Milford, Oxford University Press. Pp. 2405. 46s. 6d.

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Society of Apothecaries of London

The court of assistants met on March 23, with Sir Stanley Woodwark, the master, in the chair. Dr. J. P. Hedley was re-elected as representative on the Central Midwives Board, Prof. W. G. Barnard was sworn in as examiner in pathology, and Mr. C. Jennings Marshall was nominated examiner in surgery in succession to Brigadier H. C. Edwards, who has resigned. The Gillson scholarship in pathology was re-awarded to Dr. Helen Payling Wright.

Michael Powell Hutchinson, Francis Gilson Pattrick and Hujohn Armstrong Ripman were admitted to the freedom. Robert Anthony Rowan was bound apprentice to Reginald Hewlett Hayes for four years.

The diploma of the society was granted to J. W. Evans, G. L. T. M. Patey, E. A. Williams, J. M. Hanson, J. Mason, and R. Mather.

University of Leeds

At recent examinations the following were successful:

MD

J. R. Armitage and L. Rosenthal.

FINAL EXAMINATION FOR MB, CH B

O. Magidson (first-class honours); Isabel H. M. Blyth, H. N. Burwell, R. B. Jones and M. Stanton (second-class honours); Jean Bateman, J. W. Bishop, I. Bruce, L. S. P. Divers, W. D. Fletcher, D. Fox, R. Goldberg, J. F. Hanratty, Cecilia Henry, J. D. M. Holt, Agnes A. Jervis, Ursula M. Kirk, A. C. Knight, E. R. Lecutier, A. L. McKnight, Barbara J. Maxwell, M. M. Nagley, A. P. Percival, H. Shaw, Victoria M. D. N. Shaw, P. A. Thorpe, Gwenith Turnbull, W. N. Wild, and J. R. Wilson.

Medical Research Council of Ireland

The council have made the following awards:

Dr. STEPHANIE WHELAN, whole-time grant to carry out a goitre prophylactic scheme at Kilsheelan under the goitre committee of the Medical Research Council.

Dr. H. E. COUNIHAN, part-time grant to undertake (i) a tuberculin survey of patients attending the Rotunda Hospital, (ii) the calculation of death-rates in different age-groups for the counties of Ireland, (iii) the correlation of these rates with environmental factors under the direction of Prof. T. W. T. Dillon.

Dr. S. J. BOLAND, grant-in-aid to undertake investigation into the association of stillbirth or neonatal deaths with certain adverse pelvic characteristics, at the National Maternity Hospital under the general direction of the Master.

Dr. NINIAN FALKINER, grant-in-aid for his work on placental infarcts.

Dr. F. J. GEOGHEGAN and Dr. EAMONN DE VALERA, grant-in-aid (and part-time grant to Dr. Geoghegan) to undertake an investigation into the ætiology of pregnancy toxæmia at the National Maternity Hospital under the direction of Prof. J. McGrath.

Dr. P. L. BRENNAN, grant-in-aid for an investigation into tuberculosis under the direction of Professor McGrath.

Prof. W. J. E. JESSOP, grant-in-aid for an investigation of rickets in children in conjunction with Dr. W. R. F. Collis and Dr. H. Pringle.

The following have had their grants renewed for further periods: Dr. T. E. T. Bradshaw, Prof. J. F. Donegan, Dr. E. M. Mason, Dr. D. K. O'Donovan, Miss O'Malley, Prof. R. A. Q. O'Meara, and Prof. Hans Sachs.

The Practitioner and Industrial Medicine

At a meeting of the Paddington Medical Society on March 30, Dr. H. B. Morgan, MP, maintained that if the practitioner knew more about industrial medicine he could do much to check the war-time increase in industrial diseases arising from bad feeding, the blackout, the introduction into industry of a new class of workpeople, and the hasty construction and equipment of some new factories. The factory medical inspectorate is far too small to undertake the control of industrial illness alone, and the practitioner is often ill-equipped to help as he should. Dr. Morgan was supported by speakers in the discussion in his plea for better teaching of industrial medicine. The authorities were urged to familiarise doctors with conditions of work by organising visits to factories and laboratories, preparing and showing films, and so on. This familiarity would help the doctor to show more fairness and discrimination in dealing with the overtired, nervous, unproductive worker. Hospital physicians might do more to guide practitioners faced with new industrial diseases and new manifestations of old ones. Dr. Morgan stressed the value of ventilation in the prevention of disease. Industrial carbon monoxide poisoning, he said, is on the increase; these patients should be completely rested, rather than moved about, as is now often done. He also suggested the setting up of a body of research workers and clinicians to pronounce new benzene-ring compounds and the like non-poisonous before they are put into the hands of vested interests.

Medical Casualties

The following RAMC officers have been posted as wounded: Major D. W. Bentinck, MRCS; T/Major J. G. McDowell, MD DUBL.; WS/Captain Peter Unwin, MRCS; WS/Captain D. R. P. Wilkie, MRCS.

Major G. O Gauld, MRCS, missing since the fall of Singapore, is now officially reported to be a prisoner of war.

Medical Society of London

A meeting of this society will be held at 11, Chandos Street, W.1, on Monday, April 12. Pathological specimens will be shown at 4 PM, and there will be a discussion at 5 PM.

Royal College of Obstetricians and Gynæcologists

At a recent examination for the diploma the following candidates were successful:

Harrison Broadbent, Walter Calvert, Nora H. C. Clarke, F. B. Davidson, Gerald S. W. Evans, Jean A. Forbes, Agnes J. M. Gilruth, Irene D. M. Hastilow, Irene E. Howorth, Mary M. Lynch, A. S. Minabbawy, Joyce G. Neil, Erica M. Roberts, Edith Taylor, and Mary U. Wilkin.

Faculty of Radiologists

A meeting of the diagnosis section of the faculty will be held at 32, Welbeck Street, London, W.1, on Saturday, April 17, at 10.30 AM. Dr. J. W. McLaren will speak on kymography and its application to œsophageal movement, and Dr. George Simon on early X-ray changes in adult pulmonary tuberculosis.

Society of Thoracic Surgeons of Great Britain and Ireland

This society will hold a meeting at 1, Wimpole Street, London, W.1, on Wednesday and Thursday, April 14 and 15. The subjects for discussion will be first-aid treatment of chest wounds and injuries; the early and late treatment of retained foreign bodies; the rôle of the general surgeon in the treatment of chest wounds in forward areas; and the treatment of pleural empyema. Officers of the British, Dominions and Allied medical services, and general surgeons of the EMS will be welcome after obtaining permission from their own higher authorities. The hon. secretary is Mr. A. Graham Bryce, 3, Lorne Street, Manchester 13.

Typhus Research Institute

It is announced in the German press that the biggest typhus research institute in the world has been opened at Lemburg. It has been named after Emil von Behring.

Births, Marriages and Deaths

BIRTHS

BRADSHAW.—On March 31, the wife of Dr. D. B. Bradshaw of South Shields—a daughter.

CLARK.—On March 25, at Northowram, Halifax, the wife of Lieut.-Colonel T. Lindsay Clark, RAMC—a son.

GILLESPIE.—On March 30, at Reading, the wife of Dr. E. Harper Gillespie—a daughter.

HOPE.—On March 25, at Woking, the wife of Dr. Eustace Hope—a daughter.

KROHN.—On March 31, the wife of Dr. Peter Krohn, of Oxford—a son.

MCGAVIN.—On March 29, at Leicester, the wife of Mr. Donald McGavin, M CHIR—a son.

MARKS.—On April 1, at Wistaston, Crewe, the wife of Surgeon Lieutenant K. L. Marks, RNVR—a son.

MERRINGTON.—On March 30, in London, the wife of Major W. R. Merrington, RAMC—a daughter.

ROBSON.—On March 31, at Newcastle-on-Tyne, the wife of Lieutenant L. C. Robson, RAMC—a son.

STAFFORD-CLARK.—On March 29, at Chichester, the wife of Squadron-Leader David Stafford-Clark, MB, RAFVR—a daughter.

DEATHS

ADAMS.—On April 3, Edward Coker Adams, MRCS, late Colonial Service, of Milford-on-Sea, Hants.

CARPENTER.—On April 1, at Douglas, Isle of Man, Edgar Godfrey Boyd Carpenter, FRCS, DPH, late of Worcester.

CRUMP.—On April 1, at Wickham, Newbury, Thomas Greenwood Crump, MB CAMB., aged 80.

MASTERMAN.—In Jerusalem, Ernest William Gurney Masterman, MD DURH., FRCS, DPH.

STREET.—On March 28, at Westgate-on-Sea, Alfred Francis Street, MD CAMB., DPH.

WARE.—On March 29, at Paignton, George William Webb Ware, DSO, LEGION D'HONNEUR, MB RUI, lieut.-colonel RAMC retd. formerly of Woodfort, Mallow.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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OXYGEN THERAPY IN SHOCK

GEORGE MELTON, M D LOND, M R C P
PHYSICIAN TO THE DUDLEY ROAD HOSPITAL, BIRMINGHAM

OXYGEN has long been advocated as a logical and useful remedy in shock because it will help to relieve anoxia which is an important factor in the production of symptoms. The subject of anoxia in shock has been reviewed by Boothby and his colleagues (1940) and by Harkins (1941).

Boothby advocates the early and continuous administration of 100% oxygen given by the BLB mask as an adjunct both in the prevention and treatment of shock. He points out that this results in an increase of 10–15% oxygen in the arterial blood and an even greater increase in the oxygen content of the venous blood, especially in the regions of local anoxæmia from œdema or stasis. He draws attention to the fact that with a depressed circulatory rate in shock, the blood passing through the capillaries may give up 80% of its oxygen content so that the venous blood is only 20% saturated as opposed to 60% in normal individuals. Thus the partial pressure of oxygen in the capillaries is reduced to 14 mm. Hg instead of 35 mm. Hg in normals. If pure oxygen is inhaled by a shocked person, the venous blood becomes about 33% saturated with oxygen and the partial pressure of oxygen in the capillaries is increased from 14 mm. Hg to 21 mm. Hg with an even greater increase of oxygen tension in the tissues. Where pulmonary complications are present the value of oxygen therapy is obvious, but oxygen should also be given to cases of shock in the absence of pulmonary involvement, its administration being an adjunct to more important measures such as transfusions of blood or plasma. In fact Boothby and his colleagues state that they found oxygen without transfusions adequate in the treatment of mild surgical shock. They maintain that despite experimental evidence to the contrary, high concentrations of oxygen do not produce toxic symptoms if given for periods of not longer than 48 hours, but that subsequently the concentration of oxygen should be reduced to 50–70%. Behnke (1941) however considers 70% or under as being safer for continuous administration and that higher concentrations should be used intermittently to obviate the risk of injury to the lungs.

Experimentally, oxygen has been shown to be of value, in dogs, in shock induced by such methods as bleeding, trauma and injections of histamine and of hypertonic saline (Schnedorf and Orr 1941, Wood and Blalock 1940, Davis 1941). Shocked animals breathing oxygen, when compared with control groups breathing air, survived longer with higher blood-pressures, slower pulse-rates and higher concentrations of oxygen in their blood. Davis suggests that oxygen is likely to produce the best results before the blood-volume has been considerably reduced, regardless of whether shock is associated with hæmoconcentration or hæmodilution; if the blood-volume is low but no further decrease occurs, oxygen may have the effect of stabilising the low blood-pressure and preventing its further fall until other forms of therapy are available.

The value of oxygen in shock during and immediately after general and spinal anæsthetics is well established. There has however been little clinical evidence published to show how much benefit can be achieved by giving oxygen to shocked cases outside this anæsthetic group and whether restlessness precludes the employment of oxygen in most of these patients. The group of cases of peripheral circulatory failure described below were given high concentrations of oxygen in an attempt to determine whether benefit ensued and what difficulties lay in its administration. A method of investigation was adopted whereby the effect of oxygen could be assessed as far as was possible independently of other measures such as transfusions.

METHOD OF INVESTIGATION

Most patients received oxygen by the BLB mask, either nasal or oronasal, the latter if the patient was unconscious or breathing through his mouth. During and immediately after anæsthesia oxygen was given by means of the Boyle's apparatus. One patient was placed in an oxygen tent. High concentrations of oxygen were employed during the shocked state, a flow of 6–8 litres per minute being generally recorded.

In order to assess the effect of oxygen independently of other therapeutic measures such as transfusions and drugs which were also being employed, oxygen was begun in many cases as soon as possible after the patient was admitted. Oxygen was given to 14 cases and observations were made on its effects before transfusions were begun; 6 other cases did not receive transfusions. However as oxygen was often given during the course of other treatment such as transfusions or morphine, clinical observations in many of the cases were made at short intervals (e.g. every 5 minutes). These frequent observations were made before, during and after oxygen therapy; thus, if any changes occurred within 5–10 minutes of commencing oxygen administration, these could with some degree of probability be attributed in part at least to the effects of oxygen. Furthermore in many of the patients, after a few minutes oxygen therapy was discontinued and further observations were then made. As will be seen from a study of the cases, changes which followed oxygen were sometimes reversed when oxygen was discontinued, again supporting the fact that these changes were due to oxygen.

The clinical observations recorded included the pulse-rate and volume, the temperature, respirations and blood-pressure. The general appearance was also noted, including the colour, presence or absence of sweating and degree of mental alertness. Other features observed were the temperature of the skin (whether warm or cold; in a few cases actual skin temperatures were recorded with a Marshall's skin thermometer) and the presence or absence of pain and bleeding. An attempt was made to assess the state of the peripheral circulation by noting the speed of return of colour after pressure on the fingers and the ease with which blood flowed when a hæmoglobin estimation was done. In a few cases the circulation time was measured (cases 4, 6, 19 and 30).

TYPE OF CASE TREATED

The cases of shock treated fell into the following groups:—

(1) Trauma due to accidents or operations: 8 patients (cases 1–8).

(2) Non-traumatic hæmorrhage: 12 patients (cases 9–20).

(3) Peritonitis due to perforated viscus or strangulation: 5 patients (cases 21–25).

(4) Postoperative lung complications: 3 patients (cases 26–28).

A small miscellaneous group of cases with peripheral circulatory failure and severe collapse were also studied and include 1 case of asthma (case 29), 1 of pneumonia (case 30) and 1 of diabetic coma (case 31).

Depending upon the degree of shock, cases were classified as follows:—

Very severe shock (12 cases).—Patient unconscious and practically moribund, with very severe peripheral circulatory failure; a systolic blood-pressure below 60 mm. Hg or unrecordable; radial pulse very poor or absent; coldness and pallor or cyanosis very pronounced and blood-flow very sluggish.

Severe shock (17 cases).—Patient often dull mentally, with severe peripheral circulatory failure; a systolic blood-pressure between 60–80 mm. Hg; a small volume pulse; coldness and pallor or cyanosis considerable and a sluggish blood-flow.

Moderate shock (2 cases).—Symptoms of collapse not pronounced, the blood-pressure being 80–100 mm. Hg.

The distinction between the various groups is of course not clear-cut and was often based on a general clinical impression as the blood-pressure could not always be regarded as a completely satisfactory guide as to the state of the patient, particularly in those cases where recovery demonstrated the presence of hypertension or where the absence of a low blood-pressure in the presence of other symptoms of shock was an indication of compensatory arteriolar spasm.

Improvement after a period of oxygen was classified as either: + (i.e. moderate improvement with increase in the systolic blood-pressure up to 20 mm. Hg and loss of cyanosis); or ++ (i.e. considerable improvement with

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increase in the systolic blood-pressure above 20 mm. Hg, loss of cyanosis and appreciable improvement in pulse-volume, blood-flow, mental state, restlessness and dyspnœa).

RESULTS

The table summarises the effects of oxygen administration and subsequent withdrawal in this series of patients. It should be pointed out that the effects which have been recorded in the table were the optimum obtained during the several periods of oxygen therapy which each patient received. In most cases the changes resulting from giving or withdrawing oxygen appeared rapidly. One of the most favourably influenced cases is described in greater detail:—

CASE 12.—Woman, aged 22. Retained placenta with post-partum hæmorrhage. Heart and lungs normal. Blood-pressure 94/60 mm. Hg; pulse-rate 104. Electric cradle; 15 min. later BP 68/44. Severe shock; oxygen begun; 10 min. later BP 94/62, pulse 112. Improvement ++. Intravenous saline begun; 45 min. later had received 0·5 l. Blood-transfusion 0·25 l. and 'Pitocin.' Still on oxygen. BP 90/44, pulse 100. Oxygen stopped; 5 min. later BP 64/32, pulse 128. Severe shock; pain +. Oxygen given; 10 min. later BP 86/52, pulse 84. Improvement ++; 5 min. later BP 94/56; 15 min. later manual removal of placenta under nitrous oxide and oxygen; 4 hours later blood-transfusion 1 l. completed. Recovered.

Effect on blood-pressure.—In most of the cases, particularly where the blood-pressure was low, there was a rise in the systolic and diastolic blood-pressures after oxygen therapy. In 14 patients this rise amounted to 20 mm. or over in the systolic pressure. Even in these patients, however, there was considerable fluctuation in the degree of rise with different periods of oxygen therapy. A striking feature noted in some cases was the rapidity with which the rise manifested itself, it often being observed within a few minutes of commencing oxygen, when such measures as transfusions would not have had time to produce much effect or as in some cases had not yet been begun. Another point noted in some of the patients was the fall, often rapid, in blood-pressure when oxygen was discontinued. It was often in the severely shocked cases that the effect of oxygen in restoring the blood-pressure was so dramatic (e.g. cases 1, 3, 5, 12, 19, 21, 22, 23, 27 and 30). This group includes cases of collapse due to trauma, hæmorrhage and operation. Cases 5, 23, 26, 27 and 30 had pulmonary complications which were an important factor in their shocked state, but the other of these severely shocked cases demonstrated considerable improvement on oxygen with a rise in blood-pressure at a time when the heart and lungs were apparently not involved. A number of cases showed only a moderate rise in blood-pressure after oxygen therapy.

Continued hæmorrhage as in cases 9 and 20 was sometimes responsible for failure to maintain an adequate blood-pressure and even transfusions were only slowly successful in restoring the blood-pressure in this type of case. Patients who were not severely shocked as a rule showed only moderate rise in blood-pressure after oxygen, and this also applied to patients whose blood-pressures were not low despite their shocked state (e.g. case 11 on admission and case 18). Sometimes, as in case 11 in the later stages and case 20, the patient despite a low blood-pressure whilst on oxygen improved in other respects and became warm and less cyanosed. Some of the patients (e.g. cases 7, 15 and 28, who were very shocked and almost moribund with unrecordable blood-pressures when oxygen therapy was begun) appeared to show very little response to oxygen, though it is possible, as in case 15, that oxygen did enable the patient to survive for a sufficiently long time to allow blood-transfusions to become effective. Nevertheless it is obvious that some cases of profound shock are irreversible and cannot be saved by any form of therapy. Thus despite marked initial improvement obtained by oxygen and other measures in some of the severely shocked patients, several of them died (cases 5, 21, 22, 23, 27, 30). Most of the deaths were in elderly patients and resulted from profound toxæmia due to peritonitis, pneumonia or uræmia.

It is known that morphine depresses the blood-pressure and that oxygen will restore the blood-pressure in a morphinised patient (Clark and Hamill 1914). In 9 of the patients to whom morphine had been given, the rise of blood-pressure during oxygen therapy may have been due to this factor; nevertheless only 2 of these patients (cases 3 and 27) fall into the group of cases in which the rise of blood-pressure after commencing oxygen was pronounced.

A mixture of carbon dioxide and oxygen was often effective in raising the blood-pressure (e.g. cases 5, 21 and 23), but occasionally proved unsuccessful.

Effect on the pulse.—The effect of oxygen on the pulse was inconstant. In those cases, often associated with rise in blood-pressure, where the general condition of the patient improved the pulse-volume was increased. In 15 cases, 13 of whom had tachycardia, the rate was reduced during oxygen therapy, often by more than 10 beats per minute. In 4 patients the rate was increased during oxygen administration; in 1 of these the initial rate had been slow and in 2 normal.

Effect on respiration.—The depth of respiration was sometimes increased when the BLB mask was applied, possibly owing to the rebreathing of carbon dioxide. The effect was more pronounced when a mixture of carbon dioxide and oxygen was administered. Cases 7 and 21, who became apnœic and almost moribund soon after their operation, improved very strikingly on this treatment. When there was Cheyne-Stokes respiration, oxygen—and to an even greater extent carbon dioxide and oxygen—was successful in abolishing this whether morphine had previously been given or not. Generally when the respirations were rapid, particularly but not necessarily in the presence of pulmonary complications, the effect of oxygen was to reduce their rate. Although oxygen often relieved dyspnœa, the BLB mask sometimes produced respiratory discomfort. In the case of slow or Cheyne-Stokes breathing, oxygen and even more strikingly carbon dioxide and oxygen increased the respiratory rate.

Effect on other symptoms.—In nearly every case, whether pulmonary complications were present or not, the colour was improved and the cyanosed tinge associated with the collapsed state was diminished or abolished by oxygen. When the patient was moribund or severely shocked, the effect of oxygen on the colour was sometimes not pronounced.

In patients who were mentally dull, an increased alertness and sense of well-being often followed oxygen administration. With improvement in the general condition the patient often felt warmer, but insufficient skin temperatures were taken to determine this point accurately. The blood-flow was demonstrably more rapid in those cases which improved decidedly, but in other patients was difficult to assess. The flabbiness of the pulp of the fingers, often pronounced in shock, appeared to be lessened in those patients which improved considerably, but differences were generally slight. Oxygen appeared to have no obvious effect on pain.

Though experimentally the circulation time (arm vein to tongue) has been found prolonged in shock (Olson et al. 1941), the few observations made in this series did suggest that this was not always so. In case 4 the circulation time (decholin method) was prolonged to 25 sec. After oxygen it was reduced to 15 sec., but this may have been associated with increased mental alertness. In case 6 during the period of shock the circulation time was normal (14 sec.). In case 19 it was within normal limits (16 sec. by calcium gluconate method) during the collapsed state, and was reduced to 10 sec. when the patient had recovered. It is obvious that the circulation time, when measured by standard methods from arm vein to tongue, is no indication of the circulation rate through muscles or viscera.

Tolerance to BLB mask.—In all the cases it was found possible to administer oxygen, at least for some period during their shocked state, though there was sometimes discomfort due to the mask. In a few cases restlessness temporarily prevented the mask from being applied. The employment of morphine in such cases often enabled oxygen to be administered effectively.

CONCLUSIONS

The foregoing observations lend support to the view generally held that oxygen is of benefit in cases of shock, particularly in the more severe cases: the effect in

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EFFECTS OF OXYGEN THERAPY IN SHOCK

Case	Age and sex	Diagnosis	Operation	Degree of shock	Effect of oxygen	Effect of withdrawing oxygen	Other treatment	Result
1	84 F	Compound fractured humerus	Amputation of arm	S	Imp. + +	Worse	IS; bl.-tr.; morph.	R
2	45 M	Fractured pelvis; rupt. urethra	Suprapubic cystotomy	S	Imp. +	..	IS; IP; morph.	R
3	63 M	Fractured pelvis	..	VS	Imp. + +	Worse	IP; bl.-tr.; morph.	R
4	72 F	Fractured cervical spine with quadriplegia	..	S	Imp. +	Worse	Morph.	D
5	64 M	Fractured ribs; rupt. lung and spleen	Aspiration, hæmothorax	VS	Imp. + +	Worse	Morph.; bl.-tr.	D
6	64 M	Peptic ulcer; hæmatemesis	Gastrojejunostomy	VS	Imp. +	Worse	Morph.; bl. tr.	D
7	63 M	Peptic ulcer	Partial gastrectomy	VS	ISQ	ISQ	Bl.-tr.	D
8	31 F	Cholecystitis	Cholecystectomy	M	Imp. +	..	Bl.-tr.	R
9	27 F	Retained placenta; PPH	Manual removal of placenta	S	ISQ	ISQ	Bl.-tr.; morph.	R
10	31 F	Retained placenta; PPH	Manual removal of placenta	S	Imp. +	..	Bl.-tr.; morph.	R
11	38 F	Retained placenta; PPH	Manual removal of placenta	S	Imp. +	Worse	Bl.-tr.	R
12	22 F	Retained placenta; PPH	Manual removal of placenta	S	Imp. + +	Worse	Bl.-tr.	R
13	32 F	Retained placenta; PPH	Expression of placenta	S	Imp. +	..	Bl.-tr.	R
14	29 F	Retained placenta; PPH	Manual removal of placenta	M	Imp. +	..	Bl.-tr.	R
15	43 F	Ruptured ectopic	Salpingectomy	VS	ISQ	ISQ	Bl.-tr.	R
16	24 F	Ruptured ectopic	Salpingectomy	S	Imp. +	Worse	Bl.-tr.	R
17	59 F	Peptic ulcer; hæmatemesis	Laparotomy	S	Imp. +	Worse	Bl.-tr.; morph.	R
18	57 M	Peptic ulcer; hæmatemesis	Gastro-enterostomy	S	Imp. +	..	Bl.-tr.; morph.	D
19	62 M	Peptic ulcer; hæmatemesis	Partial gastrectomy	S	Imp. +	Worse	Bl.-tr.	R
20	26 F	Incomplete abortion	Evacuation of uterus	S	ISQ	Worse	Bl.-tr.	R
21	70 M	Perforated peptic ulcer	Closure	VS	Imp. + +	Worse	IS; IP	D
22	62 M	Perforated peptic ulcer	Closure	VS	Imp. + +	Worse	IP; morph.	D
23	69 M	Perf. peptic ulcer; pneumonia	Closure	VS	Imp. + +	Worse	IS; IP	D
24	66 M	Small intestinal obstruction	Adhesions cut	S	Imp. +	ISQ	IS; IP; bl.-tr.	D
25	70 M	Perforated peptic ulcer	Closure	S	Imp. +	Worse	IS; IP	D
26	68 M	Carcinoma of rectum; pulmonary embolism	Colostomy	S	Imp. + +	Worse	Morph.	R
27	43 F	Ovarian cyst; pulmonary embolism	Cyst removed; embolectomy	VS	Imp. + +	..	Morph.	D
28	51 F	Cholecystitis; acute œdema of lungs	Cholecystectomy	VS	ISQ	..	Nikethamide; adrenaline	D
29	44 F	Status asthmaticus	..	VS	Imp. + +	..	Adrenaline	R
30	67 M	Lobar pneumonia	..	S	Imp. + +	Worse	Sulphapyridine; nikethamide	D
31	52 M	Diabetic coma	..	VS	ISQ	ISQ	Insulin; IS, glucose	D

S = severe shock. VS = very severe shock. M = moderate shock. Imp. + = moderate improvement (see text). Imp. + + = considerable improvement. Bl.-tr. = blood-transfusion. IP = intravenous plasma. IS = intravenous saline. Morph. = morphine. R = recovered. D = died. PPH = postpartum hæmorrhage.

raising the blood-pressure and improving the pulse, colour, mental alertness and well-being was noted in such severe cases in this series. The results can be readily understood in the cases where there was considerable lung involvement as a cause of the anoxia, but striking improvement was also obtained where the heart and lungs were not affected at the time of beginning oxygen therapy. The beneficial action of oxygen was seen in shocked patients during and immediately after an operation, but was also observed in patients who had not received an anæsthetic immediately preceding the state of shock (e.g. cases 1, 3, 5, 12, 27 and 30).

Improvement however was not always definite and was sometimes absent. Thus in some of the cases of profound shock, particularly in elderly but also in young people, improvement was not observed. This failure of response was sometimes found associated with continued hæmorrhage or severe infection or uræmia. It is possible that in some of these severely shocked cases oxygen may have helped to tide the patient over a critical period, even though immediate improvement was not obvious. Nevertheless there were 14 deaths despite initial improvement in 12 of these fatal cases; but most of these were of hopeless prognosis from the start of treatment.

Experimentally oxygen appears to be most useful in hæmorrhage which has been arrested, and this is supported clinically by this series. Hæmorrhage was a definite factor in producing shock in 17 of the patients and 13 of them improved with oxygen. The importance of stopping bleeding so that satisfactory resuscitation does not start it up again is obvious.

In 13 cases hæmorrhage was not a factor and 10 of these patients improved with oxygen therapy. With the exception of cases 1 and 3, most of the patients in this group were either suffering from pulmonary complications or were recovering from a general anæsthetic. Despite the beneficial effect of oxygen on cases 1 and 3, many more clinical observations are required on the results of oxygen administration to cases of shock associated with hæmoconcentration and not complicated by anæsthetics or pulmonary conditions.

It is obvious that in severe cases oxygen can in no way replace more important methods of treatment such

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as transfusions, but must be regarded as an adjuvant to such treatment.

Morphine is often given to shocked patients, but it further depresses the medullary centres despite its advantages in allaying pain and restlessness. The fact that oxygen helps to counteract the depressing action of morphine on the medulla is an added reason for its use, particularly as the morphinised patient will as a rule tolerate the BLB mask well.

This investigation was carried out at Lewisham LCC Hospital, and my thanks are due in particular to Dr. E. D. Barlow and to Dr. A. Freedman for their valuable coöperation. My thanks are also due to Dr. W. Allen Daley, medical officer of health to the LCC, for permission to publish this report.

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NECROSIS OF ISLETS OF LANGERHANS PRODUCED EXPERIMENTALLY

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FROM a preliminary review of available literature we have been unable to find that selective necrosis of the islets of Langerhans in the pancreas has ever been produced artificially. It is at any rate safe to say that if success has ever been achieved in this direction the exploitation of the result has as yet had no influence on the study of the complex problems of hyper- and hypoglycæmia. We propose to describe two procedures by which this form of lesion has been obtained in the rabbit and to give an account of the pathological changes in the pancreas and of symptomatic manifestations which accompanied their development.

STYRYL-QUINOLINE NO. 90

Some years ago research was carried out by one of us (H. L. S.) on the pathological effects which followed inoculation of rabbits with this synthetic compound, the chemical nature of which is indicated by the full name: 2 (*p*-acetylamino-styryl) 6-dimethyl-aminoquinoline methochloride. This substance was first prepared by Cohen and Ellingworth and when tested by Browning and Gulbransen was found to have curative properties for infections with *Trypanosoma brucei*. Its applicability as a drug was however diminished by the fact that it sometimes caused acute nephritis (Browning et al. 1926, 1930). The features of this nephritis were subsequently studied by Sheehan (1932), in the course of whose research peculiar effects were noted in about a dozen rabbits which received toxic doses intraperitoneally. The protocols of these experiments owing to war conditions are not at present accessible, but the essential facts can be given from memory. Within a few minutes of receiving the doses the animals lay out prone with hind legs stretched behind and heads tilted upwards. They were obviously much disturbed and their respirations were unduly rapid. Blood examination revealed a rise of blood-sugar within an hour or so; this sometimes reached as high as 500 mg. per 100 c.cm.; in less severe cases to 300 or 350 mg. As the animals became very collapsed it was soon impossible to obtain blood samples. They generally died in 12 to 18 hours.

On histological examination of the organs of these animals post mortem it was found that there was in all of them necrosis of the islets of Langerhans in the pancreas. The cytoplasm of the islet cells was homogeneous and strongly eosinophil without vacuolation. Their nuclei, normally rounded or oval, were shrunken, angular and pyknotic, or losing their staining. Usually a few cells at the periphery of the islets retained the usual tinctorial properties of live cells in strong contrast with the dead ones. No distinctive lesions were found in other organs examined except the kidneys.

The importance of a selective lesion of islets was recognised at the time but, as the substance which produced it was one entirely foreign to metabolism, the observation was regarded as a somewhat accidental one. The lesion also was invariably fatal and as it appeared to lie outside the direct line of the problem in hand it was set aside for the time being and no opportunity has so far presented for further study of it.

ALLOXAN

Experiments were being conducted recently by one of us (J. S. D.) with the object of elucidating the pathogenesis of the renal lesion of the crush syndrome and of the somewhat similar condition which has been observed to follow the accident of a mismatched blood-transfusion. In the course of these experiments trial was made by intravenous injection of a number of substances which might influence particularly the lower segments of the renal nephrons. Among other lines investigated in this way uric acid and related products were exhibited, as it had been found by Dunn and Polson (1926) that uric acid, suitably applied experimentally, could produce a selective lesion in the renal second convoluted tubules and collecting tubules. Among the substances in this series alloxan was found initially to give very promising results which may be recorded at another time. A difficulty which arose, however, in the successful establishment of a tubular nephritis by use of alloxan was that with the order of dosage required for this purpose many animals died during the first day or so with distinctive symptoms which were not referable to renal disease. It was in the investigation of these early deaths that a lesion was discovered in the islets of Langerhans.

Alloxan, the ureide of mesoxalic acid, is a substance which finds most frequent mention in works on physiological chemistry as a component of the uric acid molecule; from this it can be obtained by oxidation with nitric acid. In recent years it has been employed in some biochemical investigations concerned with oxidations and—according to Karrer (1938)—it is introduced at one stage in the manufacture of lactoflavin. We have failed to find any recent reference to investigation of its pathological effects when inoculated into animals. It is a crystalline powder, faintly pink, and is soluble in distilled water up to at least 5%.[1]

An account of our results with alloxan may most easily be introduced by detailing one of the earlier experiments in which islet lesions were found:—

RABBIT 1.—Weight 1990 g.; had appeared normal under two days observation in a urine cage. Its blood-urea was 49 mg. per 100 c.cm. Starting at 10.17 AM on Nov. 4, 1942, it was given three doses of alloxan intravenously in half an hour; each dose amounted to 100 mg. per kg. of body-weight, the drug being in 2% solution in distilled water. Hæmoglobin solution, 4 c.cm., was also given intravenously between the first and second doses and after the last dose. The animal was quiet but by no means collapsed during the rest of the day and was not thought to be in a precarious condition when last seen at night. It consumed a quarter of the usual ration of oats and bran. Next morning it was lying prone in a feeble state and in an hour became rapidly worse, falling on its side with legs outstretched. It appeared to be comatose, but the conjunctival reflex remained active and it could be roused. The breathing was slow and fairly deep but feeble. The animal was now cold to the touch and the rectal temperature, normally 102° to 103° F. was below 93° F. Being obviously moribund it was killed by chloroform 28 hours after the start of the experiment. A sample of blood taken at autopsy showed the blood-urea to be up to 101 mg. per 100 c.cm. while the blood-sugar was only 59 mg.: the normal in a rabbit in the morning is found to range from 100 to 140 mg.

Autopsy.—No change was noted, by naked eye, in any of the organs except the kidneys. These were slightly swollen and plum-coloured and showed dark red tubular streaks in cortex and medulla due to precipitated hæmoglobin.

1. The product we used was obtained from British Drug Houses Ltd.

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The only organs with noteworthy histological changes were the kidney and the pancreas. In the former the existence of an early tubular nephritis with hæmoglobin casts in the lower parts of the nephrons was confirmed. In the pancreas the acinar tissue appeared normal; some eosinophil casts were present in ducts. The islets of Langerhans were all abnormal; in most of them there was complete necrosis of the central cells leaving only a ring or a crescent of live cells at the periphery; rarely, all the endocrine cells were necrotic. The protoplasm of the dead cells had the characteristic appearance of coagulative necrosis and often their bodies had fused into a mass (fig. 1*c*; compare fig. 1*a*). The nuclei had lost all the normal basophil staining of chromatin and took on eosin more intensely than did the protoplasm; their edges were ill-defined as if they were undergoing lysis. The surviving peripheral cells generally had nuclei of normal appearance, as had sometimes their protoplasm, but very often the cell bodies were somewhat swollen and definitely eosinophil though evidently not necrosed; in some of these the nuclei were small and hyperchromatic.

Deaths with symptoms such as have been described above have now been observed in over a dozen rabbits after intravenous dosage with alloxan. In some of these hæmoglobin also had been administered, but it is now clear that the giving or not of hæmoglobin is immaterial to the result. We shall give some facts about only 9 more of these experiments in which the pancreas was examined and the islet lesion found. Death occurred in 4 rabbits during the night at times estimated as 12–17 hours, after dosage. One died under observation at 27½ hours and another animal was killed when moribund after 48 hours. One was killed for examination on the fifth day of the experiment while still in fair condition. In 2 instances the animals were under observation (with temperature readings) after heavy dosage, and were killed before collapse set in but at times (8½ and 12 hours) when it was considered probable that islet lesions had developed; in both it was ascertained that the islets had become necrosed.

In all of these experiments, as in rabbit 1, all the islets showed some degree of necrosis and generally this was extensive. The stage of development of the necrobiosis varied in accordance with the period of survival and in a way corresponding to the evolution of such changes in infarcts. In the earlier deaths the cell-bodies were rounded off with sharper definition than normally and the cytoplasm was strongly eosinophil with loss of texture; the nuclei were highly pyknotic, shrunken and angular, and in some cases there was early karyorrhexis (fig. 1*b*). In the later examples, as in fig. 1*c* the nuclei had lost all basophil staining and the cells were fused into a mass, while live cells at the periphery were sharply differentiated. In the animal killed at 5 days very few cellular islets could be recognised, but on close examination shrunken remains of necrosed islets could be identified, sometimes with one or two live cells at their margins (fig. 2).

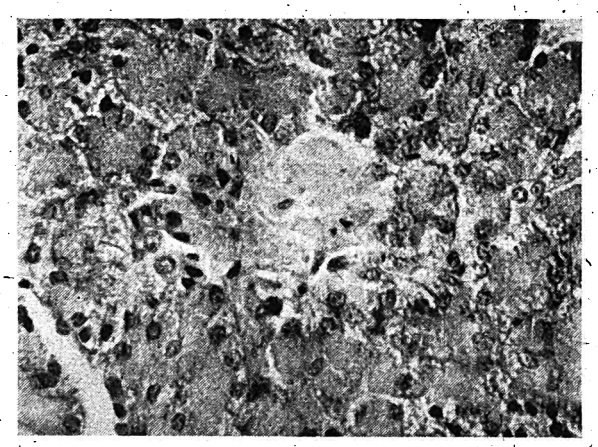
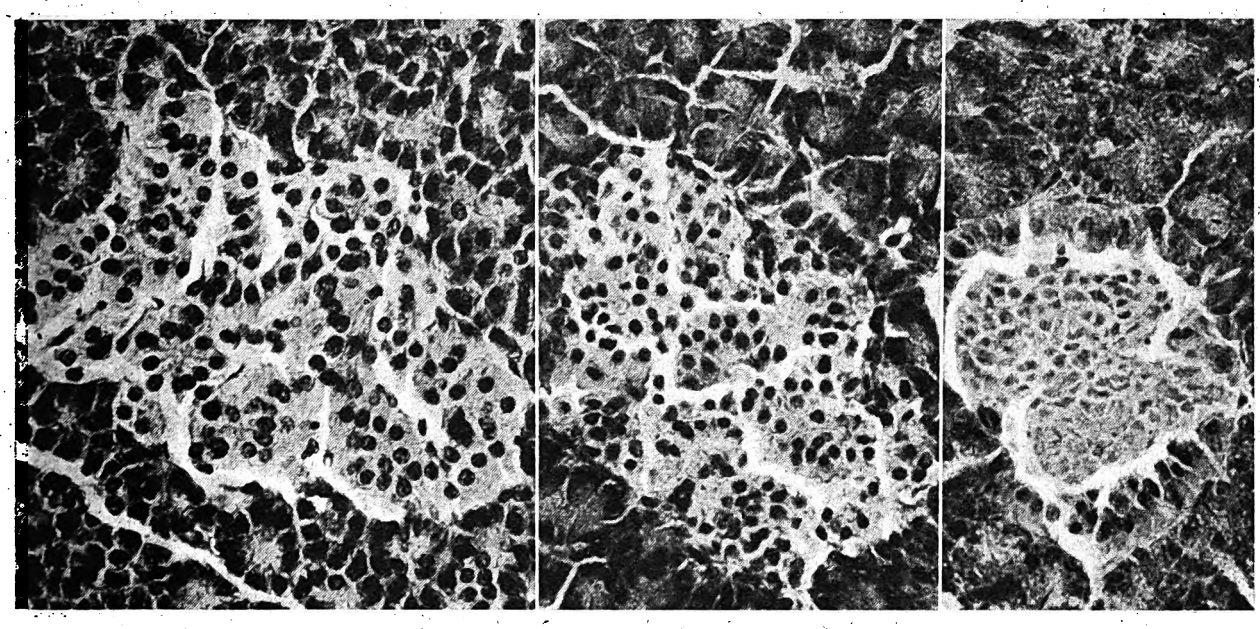


Fig. 2—Shrunken remnant of necrosed islet 5 days after a single dose of alloxan. × 350.

In view of the close linkage known to exist between the activities of certain of the ductless glands some investigation of the other endocrines has been made in most animals with islet lesions. The suprarenal cortex and the thymus have sometimes shown congestion and petechial hæmorrhages while minor cytological changes have been observed histologically in the thyroid. The pituitary and the parathyroids have been normal. Further investigation of these other endocrines is clearly desirable but meantime it can be said that such alterations as they exhibit are far behind the lesions of the islets in extent and severity.

The dose of alloxan required to produce necrosis of the islets is difficult to define. In the 9 animals which have been referred to the doses were of the order of 200–300 mg. per kg. of body-weight, administered within two minutes or spread over periods up to six hours. In one other animal the effect was seen after only 100 mg. per kg. spread over four hours; it died six hours after the start of the experiment. On the other hand sur-



a *b* *c*

Fig. 1—(a) A normal pancreatic islet in the rabbit, stained with hæmalum and eosin; the same stain was used for b and c. All × 350. (b) Total necrosis at an early stage, 8 hours from start of experiment. (c) Necrosis of central cells of a pancreatic islet, with survival of a peripheral layer of cells above and below; time, 28 hours from start of experiment.

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vival without severe symptoms has been noted after doses of 300 and even 500 mg. per kg. given on one day. These considerable variations in effect appear to us to depend most probably on the immediate nutritional condition of the animals, but this is a matter which requires further analysis. Meantime we consider that a single intravenous dose of 300 mg. per kg. to an adult rabbit of average nutrition can be depended upon fairly certainly to produce an extensive lesion of islets with characteristic symptoms.

The most important clinical observations that we have been able to make on a few animals, apart from general assessment of condition by handling, have been on the bodily temperature and on the blood-sugar. The temperature has shown a fall from the normal of 102°–103° F. to about 100° F. after three or four hours, but sometimes earlier, while the rabbit, though quiet, was still strong when handled. Later, at periods varying with the animal's resistance the fall has been steep, and, with the onset of collapse, has sunk to unregistrable levels below 94° F. One showed a fall from 100·6° to 94·6° F. in three hours.

The blood-sugar, initially 100–140 mg. per 100 c.cm. has risen considerably for one or two hours, reaching 380 mg. in one instance, and has then fallen in three to five hours to 100, 50 or even 30 mg. The terminal phase may not always have been seen, the animal being killed to ascertain the state of the pancreas. No glycosuria has been detected by Benedict's qualitative test in any of these animals.

DISCUSSION

Evidence has been submited that it is possible by the introduction of either of two chemical substances into the intact rabbit [2] to produce selective necrosis of the islets of Langerhans of the pancreas, while the acinar tissue remains histologically normal and the other endocrines are but little altered. This organic effect, a virtual nesidiectomy, along with the pronounced disturbance of sugar metabolism which accompanies it, may first of all be recognised as complementary to the well-established procedure of pancreatectomy, in binding down, if that were necessary, the endocrine function of this organ in respect of sugar to the islets of Langerhans. The operative measures required to reproduce this lesion are of the simplest kind, and we believe that the method will be found to provide valuable results in the study of acute disturbances of sugar metabolism.

On the basis of information already obtained several important questions arise the solution of which will require much further investigation but which appear suitable for preliminary discussion; these may be taken as follows:

1. *How is the islet lesion produced?*—Where the introduction of a chemical substance into the living body results in selective damage of a particular tissue or tissues a possible interpretation is that certain protoplasm is specially susceptible to the action of certain agents and that this action is fortuitous. Another general type of interpretation, which was put forward by Dunn and his colleagues (1924) in relation to experimental tubular nephritis, is that selective tissue-injury may be determined through the special function and functioning state of the cells in question. In the case of renal epithelium it appears probable that the concentrating faculty of the tubules raises the percentage of foreign toxic agents to a level at which they can exert destructive local effect; change in reaction of the filtrate may also play a part. In the case of a preferential damage of the pancreatic islets the damage may well be brought about by extreme hyperfunction and overstrain resulting from overstimulation. It appears to be a view acceptable to many in the modern approach to diabetes that the islets can suffer functionally from overstrain imposed by a diet too rich in carbohydrate and uncorrected by sufficient insulin. In the present artificial disease the evidence we have is that at an early period in hours there is a rise of blood-sugar which might theoretically be due either to excessive mobilisation through the adrenosympathetic or to diminished combustion due to lack of insulin. The blood-sugar soon falls however, and to subnormal levels, and this suggests that insulin has been at work in amount sufficient to overwhelm the initial excess mobilisation of sugar. When death occurs, and that may be within twelve hours, the islets are necrotic, and if necrosis of islets had been the first event a rise of blood-sugar, continuing to the end, might have been expected; the fact is that there is finally an extreme hypoglycæmia, and we conclude that insulin production must for a time have been at least sufficient and has probably been excessive. This would imply the existence of live and functioning islet cells for a certain length of time, and that necrosis of these cells represents a terminal failure.

2. *By what mechanism are the islet cells stimulated?*—Granted that the islets can be overstimulated it may well be asked why the particular agents that have been employed in these experiments should exert this action. So far as the synthetic styryl-quinoline is concerned we have no answer to this question. In the case of alloxan it is different, for alloxan, whether free or as a component of certain purins, is a natural constituent of the body. It exists in uric acid which originates partly exogenously from nucleins, &c. in food, and varies in amount according to the diet. Uric acid also originates endogenously. The main source of endogenous uric acid which is excreted in human urine is voluntary muscle and muscle is also in mass the greatest consumer of sugar. Can it be that alloxan or a purin which contains it is a natural hormone of muscle, discharged into the blood proportionately to muscular activity and katabolism and that through this agency the islets are normally stimulated and their activity regulated? Some such chemical interaction seems to be a desideratum, to account for the exact and rapid regulation of blood-sugar which is normally maintained in spite of vast changes which can occur in the rates of storage and of combustion of this carbohydrate. A question that remains to be solved is whether stimulation of the islets is due to a direct action on them of the activating agent or whether it is secondarily the result of hyperglycæmia due to stimulation of the adrenosympathetic. The evidence that they have at any rate received an excessive stimulation appears to us to be very strong.

3. *Can the acute necrosis of islets have any significance for human diabetes?*—It is not to be looked for that fulminating lesions such as have been described should find an analogue in the developed disease of diabetes mellitus where some length of life is necessary in order to allow the features of the illness to manifest themselves. Such changes as occur in the islets in diabetes—if any can be certainly recognised—are usually of a chronic or quiescent nature, and often there is no indication how they have been caused. In some instances diabetes develops in the course of chronic pituitary disease in man, and Young (1937) has had remarkable success in producing a permanent diabetes in dogs by repeated injections of an extract of the anterior pituitary gland. Some of the lesions found in the pancreas in these dogs (Richardson and Young 1938) are of a kind which might have been preceded by necrosis of islet cells. There is not yet however any compelling reason for the belief that a pituitary abnormality is at the root of most cases of human diabetes, and it may be that another lead, especially one in which the pancreatic islets are directly concerned, will be welcomed by experimenters in the attempt to elucidate the pathology of this disease. So far we can say nothing about the possibility of maintaining animals alive after necrosis of the islets, nor have we obtained chronic lesions by any form of prolonged treatment. We believe however that experiments toward these ends are worth undertaking, even if considerable difficulties have to be surmounted before success is achieved. It is something of a first step to be able to strike at the endocrine elements in the pancreas while leaving the exocrine parenchyma in its natural state.

SUMMARY

Acute necrosis of almost all the islet tissue of the pancreas has been observed in rabbits after intraperitoneal inoculation of a synthetic styryl-quinoline, and also after intravenous inoculation of alloxan. The development of this lesion is accompanied by an initial rise of blood-sugar, followed by an intense hypogly-

2. The same lesion has now been produced in the albino rat by subcutaneous injection of similar doses.

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cæmia which ends fatally with subnormal temperature in 12–48 hours. It is suggested that the lesion may be caused by overstimulation of the islets with overproduction of insulin, and later death of the cells from overstrain. The mechanism of production of the lesion is discussed and reference is made to the possible rôle of alloxan as a hormone of muscle. Investigation of this lesion is suggested as one line of inquiry into the causation of diabetes mellitus.

We are indebted to Dr. S. V. Telfer for biochemical data and to Mr. John Kirkpatrick for the microphotographs. The experimental work was carried on by means of a grant from the Rankin Medical Research Fund of the University of Glasgow, and for this we express cordial thanks.

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PARATYPHOID B INFECTION

THE INEFFECTIVENESS OF SULPHAGUANIDINE

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SULPHAGUANIDINE has been found to be of value in the treatment of certain infections of the intestinal tract, particularly bacillary dysentery (Marshall et al. 1941, Anderson and Cruickshank 1941). Marshall and his colleagues (1940), who introduced the compound, suggested that it might be effective in the treatment of typhoid. Levi and Willen (1941) have reported the successful treatment of a typhoid carrier with sulphaguanidine. We have been able to test the effect of the drug in a fairly large series of patients suffering from paratyphoid B infection. The investigations were carried out on three groups of patients: those in the acute stage of the disease, those in early convalescence, and those still excreting the organisms after several months.

SULPHAGUANIDINE IN THE ACUTE STAGE

An outbreak of paratyphoid B infection occurred in Liverpool during July and August, 1941. The work was done in two of the city hospitals, each of which had devoted special wards to the treatment of paratyphoid patients. The plan of the experiment was to treat some of the patients and to compare their progress with that of similar patients who were not given any special therapy. Selection of cases was made according to their location in the wards, those on one side being treated with sulphaguanidine, while those opposite were controls. This method was used in order to simplify the giving of the drug by the nurses. After the initial division of patients had been made, several other cases of paratyphoid were admitted to the same wards, and these were accepted as additional controls. The number treated was 40 and there were 48 controls. The two groups appeared to be similar in all respects. The average age of the treated patients was 16·6 years; that of the controls was 15·5 years. In the treated group there were 20 males and 20 females; in the control group there were 23 males and 25 females. The only persons excluded from the study were children under 5 years of age.

Sulphaguanidine treatment was given for a 10-day period. Dosage was as follows:

Age of patient (years)	First 5 days g. daily	Second 5 days g. daily
5– 9	8 ..	.. 4
10–14	12 ..	.. 6
Over 15 ..	16 ..	.. 8

None of the treated patients had severe diarrhœa at the time of beginning the study; accordingly the day's medication was given in three doses; at 8 AM, 2 PM and 8 PM. As a precaution against urinary tract damage, due to deposition of crystalline sulphaguanidine or acetylsulphaguanidine, instructions were given for all patients, controls as well as treated, to drink at least 3000 c.cm. of water per 24-hour period. Urine output was measured in the treated patients and in nearly every instance this exceeded 900 c.cm. daily. Output was not measured in the control group.

Response.—All patients were examined at least once a day. No effect on the course of the disease, such as lowering of temperature or diminution of symptoms, could be detected in patients who received sulphaguanidine. Many persons continued to have a high fever throughout the course of treatment. It is true that the fever dropped critically in 6 of the treated cases following the exhibition of the drug, but a similar improvement was shown by 12 other patients either in the control series or in the treated series but before treatment had been instituted. The average day of disease on which the oral temperature first remained at 98·6° F. or below, was 18·8 days in the treated group and 18·1 in the control group.

Bacteriological findings.—Fæces cultures were taken on every patient during the first week in hospital and *Bacterium paratyphosum B* was isolated from the fæces of every one of the 88 patients in this study. Cultures were again taken on all patients after subsidence of the clinical illness, no patient being allowed to leave the hospital until three successive stool cultures had been negative for paratyphoid B. In the first "release" examination, 4 of the 40 treated patients had negative stool cultures. This proportion is no higher than would be expected in untreated patients at this stage of the disease. A complete tabulation of the weekly results in the two groups of patients is given in table I. There does not appear to be a significant difference in the time of clearing in the two groups.

TABLE I—RATE OF DISAPPEARANCE OF *Bact. paratyphosum B* FROM THE FÆCES IN PATIENTS TREATED WITH SULPHAGUANIDINE AND CONTROLS

Week of disease	Treated with sulphaguandine		No specific treatment	
	Cases	Cultures +	Cases	Cultures +
		%		%
1	40	100	48	100
2	37	92·5	46	96·6
3	37	92·5	42	88·2
4	34	85·0	37	77·7
5	26	65·0	35	73·5
6	16	40·0	25	52·5
7	12	30·0	17	35·7
8	11	27·5	13	27·3
9	8	20·0	8	16·8
10	4	10·0	5	10·5
11	4	10·0	5	10·5
12	2	5·0	3	6·3
13	1	2·5	..	..
14	..	..	..	..
15	..	..	..	..
16	..	..	3	6·3

SULPHAGUANIDINE IN EARLY CONVALESCENCE

During May and June, 1941, a small outbreak of paratyphoid B fever occurred in a boys' school in Taunton, Somerset. At the same time there were a few cases in the town and rural district of Taunton. During the first two weeks of July, 1941, it was decided to try to evaluate the effect of sulphaguanidine on the duration of excretion of paratyphoid B organism in patients who were for the most part past the acute stage of their disease. The clinical and laboratory work was done at the Taunton Hospital and Public health laboratory by one of us (T. F. McN. S.) with the help of two technical assistants (W. G. and E. H.).

Plan of experiment.—The group of patients available for study consisted of 29 persons; of these 7 had shown no recognisable illness but had been found to be excreting the organism, while the remaining 22 had suffered illnesses of varying severity. Since all the patients had been ill for at least twenty days, most of them for more than four weeks, and since the object of this study was to discover whether sulphaguanidine would materially decrease the period of excretion of the organism in virtually convalescent patients, the plan of the experiment necessarily differed from that adopted in the first

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TABLE II—DISTRIBUTION OF TREATED AND CONTROL PATIENTS ACCORDING TO CERTAIN VARIABLES

—	Cases	M	F	Age (years)			Length of illness (days)				Fever			Complications*	
				8–15	16–20	Over 20	Recognised illness			Excretors only	Sl.	Mod.	Long	Yes	No
							< 30	30–40	>40						
Treated	14	10	4	4	6	4	0	9	3	2	5	3	6	5	9
Control	15	13	2	6	6	3	1	9	0	5	7	2	6	1	14

Sl. = temperature for less than 10 days or no fever. Mod. = temperature for 10–20 days. Long = temperature for more than 20 days.
* Sometime during patient's illness not necessarily at time of therapy.

part of this paper. Because the percentage of those excreting the organism tends to decrease quite rapidly after the third week of the disease, as exemplified in the Liverpool epidemic (table I), it was important to take the length of illness into consideration in planning the control group. Furthermore, Holt and his colleagues (1941) in the same Liverpool epidemic have emphasised that females are apt to excrete the organism longer than males, and older persons longer than younger, so that these points also had to be considered. As the number of available patients was small it was impossible to divide them into all these different groups and take equal numbers for treatment and control. It was therefore decided to weight the experiment against the sulphaguanidine by tending to treat those who were likely to be more resistant and to have among the controls those less likely to be resistant. In this way it was thought that definite and usefully beneficial effects from the drug would be demonstrable, though the probability of being able to detect minor beneficial results would be slight. The actual distribution of the patients according to several variables is shown in table II.

The patients were examined daily and their clinical state noted. The urine and stools were examined twice weekly for paratyphoid B organisms using the tetrathionate eosin brilliant-green method described by Jones (1936). Positive urine cultures were only found on a single occasion in each of 2 patients and these findings are not considered in the final results.

Dosage of sulphaguanidine.—Since none of the patients was having diarrhœa during the period of the study and since it was necessary to reduce the burden on the nursing staff to the minimum, the drug was given each evening in powder form. Each of the treated patients received 8 g. daily except 3 of the youngest (aged 8, 14 and 13½ years) who received 6 g. daily. This dose was equivalent to between 0·1 and 0·2 g. per kg. per day, which was approximately the dose advised by Marshall for adults in his first clinical studies (Marshall et al. 1941). The drug was given for 10 days, the same dosage being used throughout. To each of the control group an equivalent bulk of kaolin—a teaspoonful—was given daily at the same time. As a precaution against any toxic effect of sulphaguanidine the patients were urged to drink about 3 quarts of fluid daily and the nurses were asked to note any obvious decrease in output, although it was impossible to arrange for it to be measured. Urine analysis was also done on all the treated patients every day, and twice weekly during the course of treatment the urine was examined for sulphaguanidine content. In order to observe any deleterious effect of the drug on the hæmatopoietic system, a total leucocyte count and a hæmoglobin determination (Talquist) was done on each of these patients twice weekly.

Response.—The effect of sulphaguanidine on the rate of cessation of excretion of paratyphoid B organisms can be seen in table III.

When tested 4 days before treatment, about half the group did not show paratyphoid B organisms in their stools. Since one stool examination is unreliable both the negatives and positives were treated. This proved to be wise, since 2 of the patients—one in the control group—were positive on a subsequent examination. From the table it can be appreciated that the number of patients excreting organisms decreased more rapidly in the control group than in the treated group. Though it might appear from these tables that sulphaguanidine actually increased the period of excretion (the probability of this distribution of figures occurring by chance is 1 : 2000) it must be remembered that the experiment was weighted against the drug so that the best interpretation would be that sulphaguanidine did not shorten the period of excretion. Later examination, at longer intervals, of the patients still remaining in hospital showed that by ten days after cessation of therapy only 1 patient was still excreting and he was one of the treated group. This patient continued to excrete for twenty-two days after cessation of therapy, his total illness from onset until he had had three negative stool examinations being 8½ weeks. In addition to the observations that sulphaguanidine failed to decrease the time of excretion of paratyphoid B organisms, it is interesting to note that the treated patient just described developed a relapse on the day after the beginning of treatment. On the third day of this relapse while therapy was still continuing, the temperature had reached 101·2° F. and at this time blood was taken for culture. Felix (1941) was able to grow paratyphoid B organisms from the blood clot; the patient's Widal reaction two days before had given a titre of 1 : 250 plus against paratyphoid B. That sulphaguanidine was being absorbed from the intestine at this time is demonstrated by the finding of 243 mg. per 100 ml. of his urine passed the previous day.

TABLE III—INFLUENCE OF SULPHAGUANIDINE ON EXCRETION OF ORGANISMS

Day of therapy	Sulphaguanidine		Kaolin control	
	+	−	+	−
4 days before	8	6	8	7
After 3 days	4	10	2	13
After 7 days	5	9	0	15
After 10 days ..	5	9	1	14
2 days after cessation ..	5	9	1	14

SULPHAGUANIDINE IN CASES EXCRETING ORGANISMS FOR MONTHS

This part of the study was conducted at the American Red Cross-Harvard Field Hospital Unit in Salisbury. The patients were sent to us by the MOH of the district in which the patients were living or hospitalised. The subjects of study were 4 patients who had been excreting paratyphoid B organisms for 3–4 months after the onset of their illness. They were all treated with sulphaguanidine (table IV); in addition, sulphadiazine, tetraiodophenolphthalein and mepacrine hydrochoride were all tried, either before, after, or coincidentally with sulphaguanidine. Neither singly nor together did these drugs influence excretion of the organisms.

Absorption of sulphaguanidine.—During these studies only slight opportunity presented itself for investigating the absorption of the drug. In one patient the blood level, estimated on the third day of therapy after he had received 8 g. daily, was 6·8 mg. total, of which 2·5 were acetylated. In 14 treated patients the concentration of the drug in the urine was estimated on the third, seventh and tenth days of therapy and on the fourth day after cessation of therapy. These estimations showed that the drug was being excreted in the urine at least by the third day of therapy and continued throughout the course of therapy, but that by the fourth day after cessation of therapy all the drug had been excreted.

Toxicity.—All the patients treated with sulphaguanidine were carefully observed for any evidence of toxicity that might have been caused by the drug. White blood-counts, hæmoglobin estimations and urine analyses were performed at regular intervals upon all the patients treated. A total of 58 patients were treated with the drug,

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TABLE IV—PATIENTS WHO HAD BEEN EXCRETING ORGANISMS FOR MONTHS, TREATED WITH SULPHAGUANIDINE

Case	Sex and age (yr.)	Week of excretion	Culture at onset of therapy			Sulphaguanidine g. daily	Period given (days)	Culture at end of therapy			Other drugs used
			Stool	Bile	Urine			Stool	Bile	Urine	
1	M 8	15	+	0	−	8	15	+ (24)	+ (18)	0	Tetraiodophenol-phthalein
2	F 46	12	+	+	−	32	8	+ (16)	0	0	,, sulphadiazine
3	F 53	16	+	+	−	9	8	+ (9)	+ (6)	0	Mepacrine hydrochlor.
4	F 66	16	+	0	−	9	8	+ (12)	0	0	,, ,,

Figures in parentheses show the number of days after treatment had begun that specimen was taken. 0 Culture not done.

and of these the following 3 were thought to show signs of toxicity:—

CASE 5.—A boy aged 13½, who had received 6 g. of sulphaguanidine daily for nine days, developed on the tenth day a pink, non-irritating, maculopapular rash symmetrically distributed over the upper part of both thighs, back and front, ankles, soles of the feet, wrists and palms of the hands. Later this spread to the abdomen and back. The pattern of the rash tended to be circinate. The face was spared, the mucous membranes were not involved and he had no conjunctivitis. The drug was stopped at once, his last scheduled dose being therefore omitted, and the rash faded almost completely in two days. His total leucocyte count on the day of the rash was 7200 per c.mm.; polymorphs 3170 (44%), non-segmented neutrophils 350 (5%), lymphocytes 3670 (51%). His previous leucocyte counts had ranged between 6200 and 7600. His urine after six daily doses of the drug contained 236 mg. total sulphaguanidine per 100 ml., of which 7 mg. per 100 ml. was acetylated. On the tenth day, after he had been off the drug for twenty-four hours, his urine contained 31·2 mg. of sulphaguanidine per 100 ml. of which 12·4 mg. per 100 ml. was acetylated.

CASE 6.—A 30-year-old married woman had received 8 g. of sulphaguanidine daily for nine days. On the tenth day she had a rash on her face and shoulders; she said she had had a slight rash "under the skin of her arms" for the last day or two. There was a blotchy, ill-defined, pinkish rash over her face, while over forearms, shoulders, upper trunk and knees there was a finely punctate, slightly papular, erythematous rash. The rash was not hæmorrhagic and did not itch. The mucous membranes were spared and there was no conjunctivitis. Her epitrochlear and axillary glands were palpable. The last dose of the drug was omitted and the rash faded in two days. Her total white-count was 7000 per c.mm.; polymorphs 1890 (27%), lymphocytes 4900 (70%), eosinophils 140 (2%), basophils 70 (1%). Her previous white counts had ranged from 5700 to 7300. Her urine, after six doses of the drug, contained 111 mg. sulphaguanidine per 100 ml., of which 13·5 mg. per 100 ml. was acetylated. On the tenth day, after being off the drug for 24 hours, 27·5 mg. sulphaguanidine, of which 12·5 mg. was acetylated, were found per 100 ml. of urine.

CASE 7.—A 39-year-old man, after receiving four daily doses of 8 g. of sulphaguanidine, complained of abdominal discomfort and loose stools. The drug was continued however for nine days, during the whole of which time the patient complained of these symptoms. After the drug was stopped there was immediate cessation of the symptoms and the patient felt and looked better. Examination of the abdomen during the period of complaint never revealed any physical signs, except a rather spastic colon. His leucocyte count varied between 5900 and 8100 throughout his course. His urine contained, on the seventh day of treatment, 119 mg. of sulphaguanidine per 100 ml., of which 3 mg. per 100 ml. were acetylated.

No hæmolytic effects were noted and no leucopenia that could be attributed to the drug. White blood-counts on the tenth day of drug therapy on 40 patients treated during the acute stage of their disease revealed an average leucocyte count of 5650 cells per c.mm., the lowest being 2600 cells. Since leucopenia is characteristic of the acute stage of the disease, leucocyte counts were also made on 14 of the control patients. This revealed an average count of 5900, the lowest being 3000. In these circumstances the leucopenia found in the drug-treated patient must more reasonably be attributed to the effect of the disease than to the effect of the drug.

Frequent urine analyses on all the treated patients never revealed any albuminuria; there was never any gross hæmaturia found, but one patient had a few crenated red blood-cells in his urinary sediment on one occasion; a heavy sediment, in which needle-like crystals resembling those of sulphapyridine could at times be identified microscopically, was always present in sulphaguanidine-treated patients. No nausea, anorexia, headache or cyanosis were observed in any of the treated patients.

DISCUSSION

The discovery of sulphaguanidine and the observation of its effect on acute dysenteric infections of the intestine naturally raised hopes that a similarly beneficial result might be obtained in the enteric group of diseases. Two reports, one by Levi and Willen (1941) mentioned above, and one by Kattwinkel (1942) seemed to confirm these hopes, and Top (1941) in his textbook suggests that sulphaguanidine might be used in the treatment of typhoid fever. However, it is worth noting that Marshall and his colleagues (1941) treated one case of typhoid fever in a girl of 13 years which did not respond as did the group of cases with dysentery which were being treated at that time. Hall (1942) treated 5 cases of typhoid fever with the drug and concluded that "very little is to be expected from the use of sulphaguanidine in typhoid fever." Eblen (1942), in discussing the treatment of various diarrhœas with the drug, commented that 9 cases of typhoid fever had not responded to it. Watt and Peterson (1942) gave 5 g. of the drug four times daily to 6 patients, ill with typhoid fever, for eight to ten days without beneficially affecting the course of the disease; nor were they able to influence the excretion of the organism in 3 known chronic carriers by means of 15 g. doses daily for fourteen days.

Our experience with paratyphoid B fever in its various stages fully confirms the experience of Hall, Eblen and Watt and Peterson with typhoid fever. Careful analysis of our data reveals no evidence that patients treated with sulphaguanidine either in the acute, convalescent or persistent excretor stage of the disease were benefited in any way. It is also clear from the data that in a disease so variable in its manifestations as paratyphoid B fever, it would be very easy to get an erroneous impression that an individual patient had benefited from the drug. This point was brought out clearly during the study of the acute stage of the disease since some of the treated patients had what looked like a critical response to the drug. That this drop in temperature was coincidental was made clear by finding equally critical falls in temperature on that day of disease in untreated patients. Premature reports on the value of a new drug, based on the observations of a few patients without adequate controls, are therefore to be deprecated.

Possible explanations for the failure of this drug to produce favourable therapeutic results in the enteric fevers studied are: first, that these diseases are not essentially local infections of the gastrointestinal tract but primarily infections of the blood-stream; and second, that, by experiments in vitro Bornstein and Strauss (1941) have demonstrated that the growth of paratyphoid B bacillus is not inhibited by the drug and that of the typhoid bacillus is only moderately inhibited.

SUMMARY

Sulphaguanidine was used in the treatment of paratyphoid B fever in patients who were: (*a*) acutely ill; (*b*) convalescent; (*c*) persistent excretors.

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During the acute stage no difference was seen in the course of the disease among the treated as compared with a control group that was untreated. In the convalescent stage there was no evidence that the patients treated with the drug excreted paratyphoid B organisms for any shorter period than the control group treated with kaolin. The drug failed to clear 4 persistent excretors of the organisms.

The absorption and excretion of the drug was followed in a few patients. It seemed to be well tolerated; only 3 out of 58 patients treated showed any evidence of toxic reaction, and this consisted of skin rashes in 2, and abdominal discomfort in 1.

The experience gained from this investigation suggests that a very careful evaluation of any new therapeutic drug must be made before accepting its usefulness in a disease so variable as paratyphoid fever.

We wish to thank Prof. W. M. Frazer, medical officer of health for Liverpool, Dr. A. E. Hodgson, and Dr. O. F. Thomas, medical superintendents of Fazackerley and Broadgreen Hospitals for their coöperation; Dr. R. de V. King and Dr. John Allen, MOHs for Taunton rural and urban districts respectively, Dr. J. F. Davidson, MOH for Somerset and Mr. D. R. Wood for friendly help; and Lederle Laboratories for supplying the drug. Data for table I were kindly given by the late Prof. H. D. Wright, Liverpool.

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FLUORINE DISTRIBUTION

C. N. BROMEHEAD
B A OXFD, F G S
HM GEOLOGICAL SURVEY

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IT is now well recognised that fluorine is an important trace element in human nutrition, though it plays a dual rôle, being probably beneficial at one level and certainly deleterious at others. This note records our observations which are far from complete on the distribution of fluorine in England and Wales; and sets forth data which may be useful to others who wish to test our observations or extend the knowledge on the distribution and clinical detection of endemic fluorosis. The data fall under three headings; the recognition of the geological formations with which fluorine is associated, the clinical recognition of the result of fluorine absorption as indicated by the mottling of human dental enamel, and finally the chemical determination of fluorine in drinking-water.

GEOLOGICAL INDICATIONS

Fluorspar (*calcium fluoride*).—In areas such as Upper Weardale, Durham, fluorspar is abundant and has long been worked. Though the solubility of the mineral is low, appreciable quantities find their way into drinking-water, many supplies of which are taken from abandoned and flooded mines in which the mineral occurs. Fluorspar is present in the Pennine area of Lancashire and Yorkshire. Sutton (1936) has described fluorine in certain Derbyshire waters in connexion with fluorspar.

Apatite (*calcium fluo-phosphate*).—In coastal areas of Essex, Suffolk and Norfolk, where the underground waters contain an unusually high amount of common salt, this reacts with the fluorine in the form of apatite, and the relative solubility of sodium fluoride therefore gives rise to a high fluorine content in the water. Ainsworth (1933) first showed in England, at Maldon in Essex, the relationship between fluorine in water and mottling of dental enamel. In the China-clay district of Cornwall near St. Austell the presence of much apatite in addition to fluorspar tends to increase the fluorine content of circulating waters.

The tendency of phosphate rocks to concentrate fluorine has been discussed in a previous paper (Bromehead 1941). In and around Spilsby, Lincolnshire, many wells derive their waters from rocks containing phosphates. Around Cambridge fluorine is associated with phosphatic beds of Upper Cretaceous age. The presence of fluorine in certain sources of London water has been determined by the Metropolitan Water Board (1936). Some South Wales coals contain considerable amounts of phosphorus and probably because of this a detectable amount of fluorine. Fluorine is associated with the area occupied by Jurassic clays in south-west Bedfordshire, Northamptonshire, Warwickshire, Oxfordshire and Berkshire, Central Somerset and Glamorgan. Some clays used in brickmaking have been shown to contain considerable amounts of fluorine.

CLINICAL EVIDENCE OF FLUORINE ABSORPTION

The dental enamel of people who have used a drinking-water containing fluorine in sufficient concentration during part or whole of the period of calcification of their teeth is characterised by the presence of white opaque spots or bands (white mottling) due to the fluorine and often in addition by brown stained patches. The stain penetrates from the surface to about a third of the depth of the enamel and is considered to occur after eruption (Ainsworth 1933, Day 1940). The extent and distribution of the mottling depends upon the duration of the fluorine intake and the age period of the subject. The degree of mottling is determined by the actual level of the fluorine intake. Many of the cases of mottled enamel we saw were in areas where the drinking-water had about 0·3 part per million fluorine (see Dean et al. 1942). It is easy to recognise mottling of the degree seen in Maldon, Essex (where the well water has 5 parts per million fluorine) both by the white opaque areas and the staining, but milder degrees with little or no staining have often been missed. In assessing the grade of fluorosis we used as our original guide the illustrations and description given by Dean (1938) and examined the teeth in daylight with the naked eye making the judgment on the mouth as a whole. Later we cut down the number of grades, originally 7, to 4—namely, severe, moderate, mild, and very mild.

CHEMICAL DETERMINATION OF FLUORINE IN WATER

The method used for estimating fluorine in drinking-water has already been referred to (Glock, Lowater and Murray 1941). The following figures are arranged according to counties, and the fluorine is expressed in parts per million, equivalent to microgrammes per c.cm.

Cambridgeshire.—Bassingbourne 0·46. Newton 0·4. Bottesham 0·32. Haslingfield 0·22. Shelford 0·17. Fulbourn 0·17. Teversham 0·1. Great Wilbraham 0·1. Barrington 0·1, Chesterton 0. Cherry Hinton 0. Melbourn 0.

Derbyshire.—Glossop 0·22. Chesterfield and Bolsover: Whispering Well 0·35; Linacre Water 0·33.

Devonshire.—Woody Bay 0·33.

Glamorganshire.—Pontypridd 0·25. Barry 0·2. Rhoase 0·2. Porthcawl 0·15. Aberthaw 0·1. Laleston 0·1. Cardiff City 0. Ewenny (river Alun) 0.

Lancashire.—Rochdale City 0·24. Bolton 0·41. Salford: Durham Road 0·3; Regents Street 0.

Lincolnshire.—Partney, near Spilsby 0·63.

London (*Metropolitan Water Board area*).—Filtered New River 0·35. Filtered Lea 0·15. Filtered Thames 0·1.

Oxfordshire.—Bampton 1·2. Launton 0·84. Thame 0·46. Black Bourton 0·46. Hook Norton 0·44. Kirtlington 0·4. Brize Norton 0·4. Stanton Harcourt 0·39. Witney 0·37. Cumnor 0·33. Steeple Aston 0·32. Aston-Bampton 0·32. Swerford 0·3. Chinnor 0·28. Kidlington 0·26. Shirburn 0·26. Hanborough 0·24. Hinksey Reservoir 0·24. Sibford 0·24. Standlake 0·23. Chipping Norton 0·22. Headington Quarry 0·17. Hardwick 0·17. Steeple Barton 0·17. Clanfield 0·17. Langford 0·17. Northmoor 0·17. Filkins 0·17. Bletchington 0·15. Burford 0·15. Cowley Marsh 0·15. Ducklington 0·14. Benson 0·14. Salford 0·14. Enstone 0·13. Little Faringdon 0·1. Lewknor 0. South Leigh 0. Eynsham 0. Fulbrook 0. Oxford City (present supply) 0. Adderbury 0·44.

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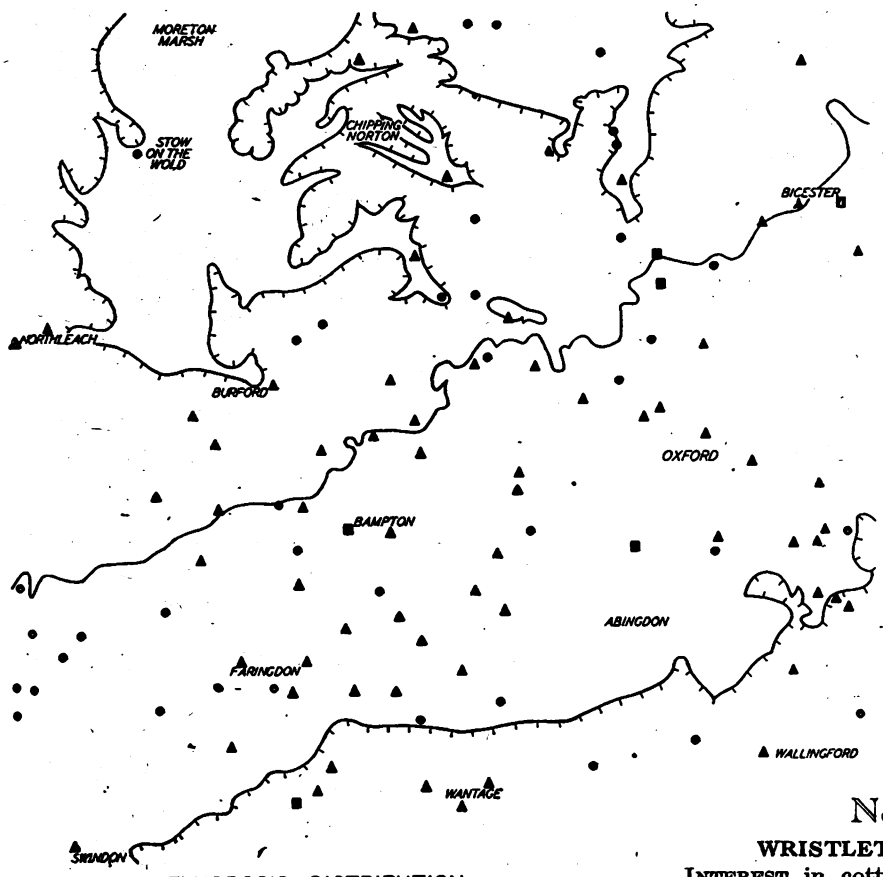

FLUOROSIS DISTRIBUTION

■ SEVERE ▲ MODERATE ● SLIGHT

UPPER BOUNDARY AT SURFACE OF KIMMERIDGE CLAY AND OF LIAS

LOWER BOUNDARY AT SURFACE OF OXFORD CLAY

Somerset.—Timberscombe 0·45. Stoke St. Gregory 0·35. Wambrook 0·3. Creech St. Michael 0·25. Old Cleave 0·25. Long Sutton 0·25. Buckland St. Mary 0·2. Combe St. Nicholas 0·15. Charlton Mackerell 0·15. Charlton Adam 0·1. Roadwater 0·1. Somerton 0.

Suffolk.—Ashfield Magna 1·0. Rattlesden 0·3. Monksleigh 0·3. Hitcham 0·25. Creeting St. Mary 0·25. Halesworth 0·2. Aldeburgh 0·2. Saxmunden 0·2. Battesford Borewater 0·2. Elmswell 0·2. Badwell Ash 0·1. Norton 0. Old Newton 0. Southwold 0.

Yorkshire.—Swinton 0·53.

Warwickshire.—Dodwell Farm 1·0. Windmill Supply, Dodwell 0·8. Drayton Reservoir 0·3. Loxley 0·26. Alveston 0·26. Wellsbourne Hastings 0·2. Luddington 0·1. Alderminster 0·1. Binton, less than 0·1.

DISCUSSION.

The combination of these three methods of approach has been worked on more freely in the area around Oxford than in any other part of the country, and the information gathered has been put into the accompanying map, in which each town or parish is marked by a symbol, indicating the highest degree of dental fluorosis noted, graded severe, moderate, mild, or very mild, as previously described.

Recently Spira (1942) published a map on the distribution of fluorosis in England. The data on which this was constructed were collected in quite a different manner; his cases were chiefly Army recruits and he recorded the degree of dental fluorosis and the subject's home town, presumably at the time of examination. It must be pointed out that it is the period up to about 14 years of age which is important.

SUMMARY

In view of the increasing evidence of the rôle of fluorine in the well-being of man and animals, methods are suggested to assist the clinician in appreciating the distribution of fluorine.

Geologically, fluorine may be found in association with fluorspar, apatite and phosphate-bearing rocks, and Jurassic clays. Mottled enamel as a sign of dental fluorosis can be used as an index of fluorine absorption. These two indications of the likely fluorine intake in any particular locality may be further substantiated by chemical determination of fluorine in the drinking-water.

We wish to thank the Medical Research Council for a grant towards the expenses of the investigation and Miss E. B. Cheek, BSc, of the Oxford Nutrition Survey, for certain of the fluorine determinations.

C. N. B. is responsible only for the geological aspects, and his contribution, including the map, is published by permission of the Director of HM Geological Survey.

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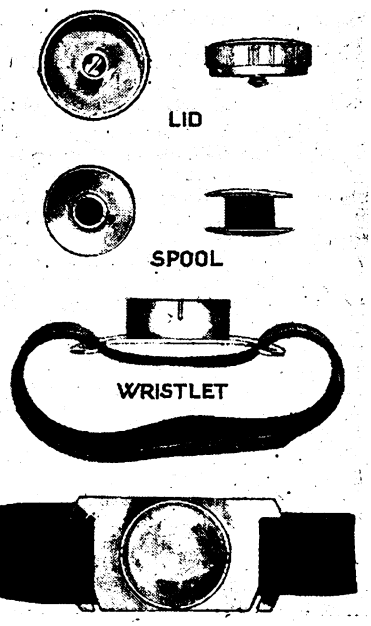
New Inventions

WRISTLET TO CARRY COTTON

INTEREST in cotton as a ligature has lately been revived by Pannett[1] and others and I have devised a small wristlet for holding a spool of cotton. No originality is claimed for this; the idea was originally borrowed from Victor Bonney's wristlet. Mine has, however, certain modifications, in that it is smaller, lighter and carries a greater length of ligature. The illustration is self-explanatory.

An ordinary small Singer's sewing-machine spool is used and as much cotton as is required is lightly wound on to this over a piece of rubber tubing, which allows for contraction of the cotton fibres during sterilisation. The spool is held in a central position by a small, spring-loaded spindle carried in a knurled nut, which is secured to the spool holder by a bayonet fastening. A rubber band secures the whole unit to the wrist. The surgeon can carry a spool of No. 40 Coats cotton and his assistant one of No. 60.



I have now used cotton exclusively for a year and my impression is that all forms of post-operative wound sepsis are less with cotton than any other ligature. It is difficult to handle and the cut ends tend to adhere to the gloves, but it has the great advantage of negligible expense (most major operations can be performed

1. Pannett, C. A. *Lancet*, 1942, **i**, 755.

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for a fraction of a penny). Another point in its favour is the small amount that will suffice for a large number of operations; it is therefore economical of space in a mobile surgical unit. It ties with a small neat knot which has little or no tendency to slip and the loose ends can be cut very close to the knot, thereby minimising the amount of foreign body left in the wound. It can be used with impunity in septic cases such as acute appendicitis with peritonitis. The best gauge is No. 60 for subcutaneous vessels, No. 40 for larger vessels such as are found in the mesentery of the appendix and No. 24 for suturing the aponeurosis when closing the abdomen.

It is not claimed that cotton will, or should, supplant catgut as a ligature, but it certainly provides a very passable substitute.

JOHN HOWKINS, FRCS
Squadron-Leader RAFVR.

Reviews of Books

Textbook of Gynæcological Surgery

(4th ed.) Sir COMYNS BERKELEY, MD Camb., FRCP, FRCS, FRCOG; VICTOR BONNEY, MS, MD Lond., FRCS, FRACS. (Cassell. Pp. 899. 50*s*.)

THIS book, produced by two great mentors in the gynæcological art, represents the mature opinion of wisdom and experience in pursuit of technique. All the indications, the risks, complications, the technical difficulties of a given procedure are set out with clear and minute details for its performance. A surgeon of mediocre ability, reading this book, could undertake any of the operations in it, so simply and concisely are the serial steps depicted. Almost every stage of each operation is beautifully illustrated by Victor Bonney in pen-and-ink sketches. As the abdominopelvic surgeon's *Pilgrim's Progress*, the book starts with instruction in equipment, theatre technique, instruments, and sterilisation; then follow the descriptions of gynæcological and many general surgical operations; the last section deals with almost all known postoperative complications, and carries an excellent chapter on transfusion and infusion. There is a final critical essay on a large number of operations and a survey of the causes of death. The text is good, the style crystalline, the plates illustrative.

Sulphanilamide and Related Compounds in General Practice

(2nd ed.) W. W. SPINK, MD, FACP. (Year Book Publishers; H. K. Lewis. Pp. 374. 16*s*. 6*d*.)

PROGRESS in chemotherapy has been so rapid that even a second edition of this book can only offer, in its 370 pages, a limited survey of the new ground covered. The subject is treated under fourteen headings, of which the most interesting perhaps are those on general principles of treatment, the local use of sulphonamide compounds, and their prophylactic use. Professor Spink lays down the following general rules for the management of patients receiving these drugs:

Patients who are seriously ill can be treated more efficiently in hospital. The micro-organism responsible for the infection should be isolated if possible, but do not delay necessary treatment until the report is ready. Blood hæmoglobin estimation and a white cell count are needed before a seriously ill patient receives one of these drugs. Urine analysis must be done daily if sulphapyridine or sulphathiazole are being given. In severe infections the concentration of the drug in the blood should be determined after 12–24 hours of therapy. Total 24-hour fluid intake and output should be registered. All patients should be asked whether they have taken any of these drugs before. All patients receiving sulphonamides must be seen by the physician at least daily and only in exceptional cases less often.

These rules may not always be easily followed but they set a standard of care and discretion. Spink notes that all American soldiers going into combat areas are being provided with 12 sulphanilamide tablets in a metal box, instructions for taking the drug being printed on the back; they also have a packet of powdered sulphanilamide to sprinkle into wounds. The possible uses of sulphonamides in the prevention of sepsis, rheumatic fever, meningitis, the complications of specific fevers, and in accidental and war wounds are fully discussed and documented, in a chapter of much interest and promise. Discussing local application, he sets out the relative merits of different solutions, emulsions, or ointments, different rates of absorption and different solubilities, and warns wisely against the risks of overdosage when the drugs are given both locally and orally. The work of Colebrook and others in the treatment of burns, and the use of sulphonamides in gas gangrene, are discussed. The great variety of mixtures employed and of lesions treated locally, whether in the peritoneum, pleura, middle ear, urinary bladder, or the surface of any part of the body offer a striking manifestation of the ingenuity if not of the caution of the profession.

This book is not only an enthralling review of the greatest advance in medicine of the century but a handbook to the proper use of the new weapon. Though doubtless it will not long remain up to date its immediate careful study should help doctors to prevent dangers, avoid waste, and get still better results with sulphonamide treatment than they are doing now.

Psychological and Biological Foundations of Dream Interpretation

SAMUEL LOWY, MD Prague. (Kegan Paul. Pp. 259. 16*s*. 6*d*.)

WHEREAS in earlier days an able man who wanted to study dreams was probably also a superstitious man, in the way that Cardan was superstitious, it is nowadays possible for a temperate physician like Dr. Lowy to refer, without conscious abuse of words, to the "science of dreams." But as Dr. Lowy acknowledges there is a great deal in the current psycho-analytical method of interpreting dreams that does not meet scientific requirements, and he therefore modestly calls his work an "approach" to the problem, in which he has relied often on intuition rather than on a demonstrable application of assured knowledge. In a foreword his teacher, the late Dr. Stekel, emphasises that the talent for dream interpretation is inborn rather than acquired. Dr. Lowy evidently possesses this talent and turns it to good account in the numerous instances of analysed dream material here quoted. His discussion of the significance of symbols, the extent of transformation, free associations and other such problems, is based on the Freudian doctrine, but with many original additions. The mode of presentation is not systematic; consequently the book is difficult reading, but sincere and at many points illuminating.

Endocrinology

Clinical Application and Treatment. (2nd ed.) A. A. WERNER, MD, FACP. St. Louis, Mo. (Kimpton. Pp. 924. 45*s*.)

Dr. Werner's good book would have been better had he more consistently traced the controlling influence of the nervous system on endocrine function, instead of giving such a mass of experimental detail; the result is a fine source-book but an inferior textbook. He aims at completeness, but in a subject as broad as endocrinology this is impossible of attainment by one man, so that omissions are inevitable. Thus he does not mention the use of stilbœstrol as the cheapest and most convenient of the œstrogens, and in a long chapter on pregnancy tests he makes no mention of the toad. The discussion of the relationship of œstrogens to cancer is full, apart from any reference to Bittner's significant observation that breast cancer in mice is transmitted by their mothers' milk. He indicates no simple path to the clinician through the tangled facts of carbohydrate metabolism and does not emphasise the clinical differentiation between the young and elderly diabetic: the one being usually thin with a normal blood-pressure, relatively sensitive to insulin, easily passing into ketosis, and doing well on a high carbohydrate diet; the other being fat and hyperpietic, relatively insensitive to insulin, seldom liable to ketosis, and doing best when starved. In a chapter on the thymus he devotes three pages to status thymolymphaticus but does not mention myasthenia gravis. Despite such omissions the book is predominantly sound and contains much information not readily accessible elsewhere, with many useful references.

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THE LANCET

LONDON: SATURDAY, APRIL 17, 1943

INSTRUMENTS OF SOCIAL MEDICINE

IT was in 1895 that the first almoner took up her duties at a hospital—the Royal Free—and nearly fifty years later her very many successors are asking, like other members of the company of healing, what of the future? A good starting-off place for such a question is to take a look at the present and the 1942 report of the Institute of Hospital Almoners records that a survey of almoners' work throughout the country has recently been undertaken by Miss HELEN REES by means of a scholarship offered by the Hospital Almoners Association. This survey shows that a number of hospitals are employing almoners to collect funds and statistics, rather than to do medicosocial work for the patients; and the inevitable result has been that the mass of financial returns and statistics, and the work of collecting vouchers for payment, overwhelm the department to the exclusion of the careful social work needed for many patients. It may be that the financial side of the work could be delegated to "assessment clerks"—a view not altogether shared by the almoner although she is clear that her primary function is social work with so-called administrative duties thrown in.

These views are finding their way to those who are planning for the future, for the report records that memoranda have been prepared during the year for the Ministry of Health and for the Royal College of Physicians. The preparation of such documents has doubtless helped to supplement the work of the survey and the definition of medicosocial work now set out is not only broader than hitherto, but it bravely stakes a claim for the almoner to be regarded as one of the most important instruments of social medicine. The almoners define their work in five main headings:—

1. To share in the discovery of those aspects of the patient's social and psychological background which are relevant to the diagnosis and treatment of his illness.
2. To cooperate with the medical staff to enable the patient to carry out the treatment recommended by helping him to understand any social problem involved and planning with him a solution.
3. To safeguard, where necessary, the patient's interests and to relieve him as far as possible from the anxieties which hinder recovery.
4. To help to re-establish the patient in normal life and to obviate as far as possible any factor which might lead to a recurrence of his illness.
5. To help the patient who can now resume normal life to adjust himself to changed circumstances and remain a useful citizen.

The almoner will also have other general responsibilities, including taking part in medical research from the social aspects, and, if required by hospital authorities, certain administrative duties. But her powers of assessment should be, as Prof. J. M. MACKINTOSH, of Glasgow, told a crowded audience at the annual meeting of the Institute on March 26, directed towards ascertaining the needs of the patient rather than the means. He urged that there should be no rigidity in the structure of almoner's work: it should be capable of ready adaptation to the changing needs of clinical medicine and the growing emphasis upon prevention and aftercare. For the future Prof. MACKINTOSH touched upon two likely fields of development. First he hopes to see almoners taking part in the teaching of medical students—"Practical guidance of the student in methods of social study and tutorial work on reporting are the windows of a new outlook on medicine." At one hospital medical registrar and almoner hold a combined tutorial on a selected series of cases. In the second place comes the position of the almoner in relation to general medical practice. Hospital authorities may not take kindly to the new orientation of the almoner's work if she ceases to be mainly a collector of funds and certainly the general practitioner may not look with favour upon the idea of yet another person coming between him and his patient. Prof. MACKINTOSH laid great stress on this: the intimate relationship between doctor and patient he regards as so important that even granted the supreme value of medicosocial work it must not weaken this relationship. If practice is to crystallise in some sort of health centre the health visitor and the home nurse—with separate functions—will work from this centre, the former dealing more with preventive measures and the latter with curative measures. The almoner should not seek to extend her work too widely here. But as a "consultant and specialist" at the health centre the almoner could establish herself as the source of invaluable advice for patient and practitioner. She would become a member of the clinical team, with active and useful participation in the great healing art. This would be a projection from hospitals where, hitherto, the majority of almoners have worked. There are already indications of this broader conception; local authorities are asking the assistance of almoners for their venereal disease schemes, for example.

Social medicine is an attitude towards the study and practice of medicine. Medicosocial workers (called it is hoped still by the good English word, almoner), if allowed, can help in the necessary orientation of the public and—be it said for them, for they are still too modest to say it for themselves—of the medical profession.

GASTRIC POLYPS AND POLYPOID GASTRITIS

PATIENT, close and accurate observation of the natural history of any disease, building up its story from the findings of physician, surgeon, radiologist and all their colleagues, usually makes good reading. Such is Sir EDMUND SPRIGGS's account of polyps of the stomach and polypoid gastritis, based on 30 cases from the Ruthin Castle clinic, supplemented by the records of 61 cases or specimens, mostly of polyps, communicated to him by clinicians and pathologists elsewhere in this country, and also by an extensive survey of papers already published. Both conditions are comparatively rare, and both depend for their recognition in life on expert radiological or on gastroscopic examination; for neither produces a characteristic pattern of signs and symptoms, although some complaint has usually directed the apparatus of investigation towards the stomach.

The polyps are often adenomata, single or multiple, stalked or sessile; some are leiomyomata, and there

1. Spriggs, E. I. *Quart. J. Med.* 1943, **12**, 1.

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is a rare mixed form. They occur in stomachs otherwise normal, or in association with atrophic changes in the gastric mucosa generally. They are commoner in the mid-gastric and prepyloric regions than near the cardia; this is true both of single and sparse growths and of polyadenomata studding the mucosa with growths too numerous to count. Half of the patients complained of dyspeptic symptoms, variable and uncharacteristic, though sometimes indicating obstruction of the pylorus by the polyp. In one-third there was considerable bleeding. Free hydrochloric acid was usually low or absent, especially in cases with epithelial tumours. Polyps therefore are uncommon unexpected findings in patients undergoing full investigation because of dyspepsia or gastric bleeding. Their treatment calls for a nice weighing of pros and cons. SPRIGGS calculates that the chance of malignant degeneration in cases recognised clinically lies between 1 in 3 and 1 in 8; in a patient who is not too old, and whose general condition encourages the belief that partial gastrectomy would involve a markedly lower risk than that, operation is to be recommended; local excision of single growths does not always obviate recurrence. Polyadenomata, and tumours having the appearance of leiomyomata are specially prone to bleed, and should be removed whenever possible; the same applies to large polyps, of whatever kind, whose size alone indicates their proclivity to further growth. On the other hand SPRIGGS has in several patients watched the unaltered presence of small polyps for ten years and more, their symptoms inconspicuous or alleviated by medical treatment.

Polypoid gastritis is an extreme form of hypertrophic gastritis in which inflammatory hyperplasia and œdema bring about gross enlargements of the rugæ; when widespread these can resemble polyadenoma and when localised they can sometimes be distinguished from carcinoma only by careful and repeated radiological examination coupled with a consideration of the clinical history. Some of the localised forms occur in the vicinity of chronic gastric ulcers, or around gastro-enterostomy stomata; in those cases free hydrochloric acid is usually present in the gastric secretion. Other localised forms (which prefer the cardiac and midgastric regions), and the more generalised forms, are independent of ulcer or operation, and often obscure in ætiology; in them free hydrochloric acid is absent or low in concentration. The accurate diagnosis of polypoid gastritis, based on a full investigation, is an important matter, for it seems clear that it has no appreciable disposition to malignant change, it seldom bleeds, and it may often be amenable to medical treatment; where the diagnosis can be confidently made, therefore, operation is rarely called for. SPRIGGS's therapeutic régime includes the elimination of septic discharges from the mouth and nose, a bland diet of the "ulcer" type but considerably modified from patient to patient to suit individual tolerances, administration of hydrochloric acid in some cases, and in many "self-lavage" of the stomach. With this régime SPRIGGS has observed gradual disappearance of the polypoid swellings, the mucosa proceeding towards atrophy. Mr. MARXER'S excellent radiograms contribute to the elegance of a well-illustrated and fully documented paper.

MEDICINE FOR THE WORKER

IT is nearly six years since Mr. ERNEST BEVIN attended the Belfast meeting of the British Medical Association and put forward a plan by which panel practitioners in industrial areas were to form groups of 20 to 30, practising from central clinics, where they would have a better chance of giving workers the medical help they need. As Minister of Labour he has again focused attention on industrial health by calling the conference we report on p. 500. Mr. ERNEST BROWN, speaking as Minister of Health, was rightly concerned that medicine should be considered one and indivisible, and that the care of the worker should be part of the comprehensive medical service he envisages. In more than one sense, the Minister's addresses illustrated the importance, as regards industrial health, of being earnest. Mr. BEVIN'S idea of group practice is much nearer realisation than it was six years ago, and it is satisfactory that neither speaker, though both paid tribute to the admirable work of the factory medical inspectorate, wants to see an industrial medical service divorced from the family medical service which Mr. BROWN is seeking to develop for the rest of the community. As Sir WILSON JAMESON put it, "apart from the special hazards that are attached to certain forms of occupation, the ills that people suffer from are the same whatever they do or wherever they live, within the temperate zone." Dr. M. W. PATERSON pointed out that in the examining surgeons we already have a large body of practitioners interested in industry, and other contributors to the discussion looked forward to factory medical work by doctors on a part-time basis. Sir WILFRED GARRETT presented figures showing that there are now 164 full-time works medical officers and 673 part-time. No-one can doubt that the full-time works doctor is a sound investment for his employer; but as Dr. CHARLES HILL remarked, the workers must often suspect that he represents their employer's interest, and in the factory medical service of the future such a suspicion must have no place. Like the regimental medical officer, the works doctor is clearly expected to be a paragon of all the virtues; but experience has shown that it is possible to become at least a valuable industrial specialist while practising some other form of medicine, and this may well be the ideal. We are reminded of the Russian system under which the doctor's working "day" lasts only a few hours, but he is encouraged to put two or even three distinct days into the 24 hours.

The part-time medical officer, however, is not all that industry requires in the way of medical aid. There are many departments of occupational medicine which are in the experimental stage, and Sir EDWARD MELLANBY, with recent history in mind, insisted that fuller use should be made of the talents of scientific investigators—for example psychologists—and the information they have provided and can provide. In the industrial medicine of the future he places the proper use of personnel far above the study of occupational hazards, which perforce have hitherto engaged most medical attention. This proper use of personnel will in the end, we hope, mean the adaptation of machines to suit men, rather than the adaptation of men to suit machines, which has been the main tendency of industrialism so far.

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Annotations

POOL OF NURSES AND MIDWIVES

THE Order requiring nurses (male or female) and midwives, between the ages of 17 and 60, to register for employment has a special interest. Under it the following classes presented themselves at local offices for registration last Saturday, April 10 :—

1. All nurses on the general or supplementary state registers of England and Scotland.
2. Nurses, not state registered, who hold a certificate of at least 3 years' training (before June 30, 1925) in a school approved by the GNC for England and Wales, or (before Sept. 30, 1925) in a school approved by the GNC for Scotland.
3. State certified midwives, whether practising or not, and all whose names have been removed from the roll for reasons other than age, infirmity or misconduct.
4. Student nurses and pupil midwives.
5. Persons who are or who have been nursing auxiliaries in the Civil Nursing Reserve, or nursing members of Voluntary Aid Detachments, British Red Cross Society, St. John Ambulance Brigade or St. Andrew's Ambulance Association, provided they have had not less than six months full-time experience in nursing duties, whether or not they are now engaged in such duties.
6. Nursery nurses who hold a certificate of training at a nursery training college or a nursery approved by the National Society of Children's Nurses.
7. Other persons who have had at least one full year of experience in the nursing of sick persons in a hospital or similar institution.
8. All persons who on March 30, 1943, were employed in or engaged for the purposes of nursing sick or injured persons.

The wording of this order is noteworthy since it clearly covers all those who are *or have at any time been* on the nursing register; as well as all midwives and pupil midwives; all those who hold qualifications which have no place in the register, such as tuberculosis and mental nurses; and all who have had some nursing experience and are therefore not complete tyros. Now that these names are safely down we have for the first time a clear record of the number of women who have taken a nursing qualification, and of the number who gave up nursing, after a fairly long period, without taking a qualification. An analysis of the reasons for their secession in this last group would indicate which reforms are most urgently needed to make the profession attractive to women. Meanwhile, as Mr. McCorquodale has pointed out in a singularly persuasive broadcast, enrolment of every actual and potential nurse should give that profession the opportunity it desires of offering the most effective help to the nation in time of need.

HYALURONIDASE AND FERTILITY

FOR ten years biochemists and experimental pathologists have been investigating the nature and properties of diffusing factors. These factors, which were originally extracted from testicular tissue, have the property of increasing the permeability of the skin to injected substances. Diffusing factors have also been found in spermatozoa, snake and spider venoms, leeches, and culture filtrates and extracts of many species of invasive bacteria. Their detection in œdema fluid has lately been suggested as a method for diagnosing gas-gangrene at an early stage.[1] There has been much controversy among biochemists about the chemical nature and the best methods of biological assay of the substances. One school argued that they are closely associated, if not identical, with a group of enzymes known as hyaluronidases which hydrolyse the hyaluronic acid of the synovial fluid, vitreous humour, umbilical cord and skin. Until recently no evidence was produced that the diffusing factors played any physiological rôle in the body, but collaboration between workers in two separate experimental fields has now shown that hyaluronidase may have a definite and important action. Last summer Rowlands,[2] of the National Institute for Medical Research, working on the production of ovulation, described a method for collecting ova from the fallopian tubes of rats. The ova, when expressed from the tube under a binocular dissecting microscope, were surrounded by a transparent viscous fluid or gel in which the cumulus cells and corona radiata were embedded. Dissolution of this gel and disintegration of the surrounding cell mass could be rapidly obtained by the addition of a sperm suspension or the supernatant fluid resulting from the centrifugation of such a suspension, and this process is apparently essential to enable the sperm to penetrate the egg. Rowlands's note attracted the attention of McClean of the Lister Institute, who has been studying diffusing factors for some years. He thought that this dispersing action might be due to hyaluronidase. The two workers[3] have since shown that this is so. Various hyaluronidase preparations were added to a cluster of 6–12 rat's eggs, and the rate of dispersal of the cells was observed under the microscope. The hyaluronidase liquefied the gel, causing the cells to fall away from the ovum. Hyaluronidase preparations from bovine testis, streptococci, *Clostridium welchii* and *Vibrion septique* all showed cell-dispersal activity proportional to their hyaluronidase activity as measured in viscosity-reducing units. The rat-sperm extract which has been used previously to disperse the cells was shown to have hyaluronidase activity. Secretions of the prostate and seminal vesicles have no dispersing action. These experiments may provide one explanation for the low fertility associated with a low sperm count. Theoretically, of course, only one sperm is needed to fertilise one egg, but in practice many million sperms are necessary. McClean and Rowlands suggest that the failure of fertility in men with low sperm counts may sometimes be due to the concentration of hyaluronidase being insufficient to liquefy the gel around the egg, thus preventing penetration of the egg by the sperm.

PREVENTIVE MEDICINE AND THE STUDENT

DISCONTENT with the too cursory and detached teaching on public health provided in most British medical schools has long been rife. Experiments in "field" methods of education have been few. Poor collaboration as between teachers of clinical and environmental medicine and the overloading of the curriculum have stood in the way of new ventures. Other countries have been bolder, or more fortunate, and in a new book Dr. Alfred Korach,[4] lecturer in preventive medicine at the University of Cincinnati, describes the programmes of field teaching taken by his sophomore students during the years 1939–42. The bibliography at the end of the volume bears witness to the interest which the whole subject is now exciting in the USA. He gives detailed time-tables. Field work included visits to slums with nurses or health-visitors, to juvenile and divorce courts and to special municipal clinics, hospitals and health-centres, instruction in the veterinary arrangements under the city health department, and inspections of dairy farms, waterworks and municipal laboratories.

Unfortunately the recorded opinions of students about these experimental courses are mostly stilted and uninspired. They suggest, on the one hand, that premedical education and prevailing literary standards have failed to develop powers of expression and, on the other, that a new variety of educational "spoon-feeding" may be coming into vogue. The course, perhaps, attempted

1. McClean, D., Rogers, H. J. and Williams, B. W. *Lancet*, March 20, 1943, p. 355.
2. Rowlands, I. W. *Nature, Lond.* 1942, 150, 267.
3. McClean, D. and Rowlands, I. W. *Ibid*, p. 627.
4. Extra-Mural Teaching of Preventive Medicine and Public Health. Alfred Korach, MD, lecturer in preventive medicine, University of Cincinnati. (Roessler Bros. Pp. 143.)

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too much or was condensed into too short a space of time. While most of the student-observers professed to find the work interesting or informative, it seldom seems to have stimulated original observation or criticism or stirred the social conscience. While some at once accepted the poverty-disease relationship and saw the urgent need for slum-clearance, others appeared to be superficially interested in what they saw without drawing conclusions from it. To cite three examples:

"I have read about the conditions in which poor people live, I have heard discussions and lectures on these conditions. Today I saw them. It has been quite an experience."

"The field trips were also enjoyable as they provided a scenery change."

"We were brought face to face with these conditions under which a large proportion of the population must live."

In these and other reports there was little to indicate that the social conditions themselves had seemed as worthy of close observation and study (with a view to their amelioration or eradication) as—let us say—an abscess, a pneumonia or a syphilitic lesion in the individual. Unless social diagnosis and social pathology come to have their proper influence on social hygiene and therapeutics we shall run the risk of preserving the limited outlook, too prevalent in the wards and laboratories today, engendered by the "interesting museum specimen" or by the "interesting" (but often incurable) case. A proper integration of medical and social study is the vital need. Doubtless in the first phases of such an experiment many of our own students, haunted by the examination system and with an ingrained tendency to prefer the accumulation of facts to critical or humane thinking, would have reacted similarly. The lesson is not that the experiment was a failure but that it needs to be continued and repeated in other places and in better forms. The unwisdom of attempting to condense a wide variety of social and sanitary instructional visits into a part, or even the whole, of one year instead of spreading them over the clinical period is one conclusion to be drawn from this monograph. The clinical text and the social text must be presented in contiguity.

CRITERIA OF MALIGNANCY

IN a distant and apparently forgotten past, it was established and taught that autonomous growth is the specific criterion of malignancy.[1] Today ideas on the nature of physiological, pathological and malignant growth are in such confusion that even the meaning of autonomous growth seems to have been lost. Difference in quantity has superseded consideration of difference in quality. This state of mind appears whenever the natural behaviour, the cause or projected cures of cancer are discussed.[2] A new view of the cause and nature of cancer is gradually being evolved, and accepted. Briefly stated it is that all growth is similar in nature and malignant growth is merely an excessive form of normal growth, with pathological overgrowth somewhere in between. The process is continuous and progressive. A resting normal cell gets a physiological push to divide; it then gets an excessive push and divides faster; division is then so accelerated that, without further stimulation, the cell continues to divide at top speed in perpetuity. Top speed division thus becomes the new criterion of malignancy. This view has led Koller[3] to examine the mechanism and chemistry of increased rate of division. It is accepted that frequency of division depends on the amount of nucleic acid in the cell and its rate of production. Koller now suggests where this quantitative change takes place. Whether or not excess of nucleic acid is a cause of increased rate of division belongs to the province of the cytochemist, who alone can measure and place these events and determine their relationships. When, however, Koller concludes that the excess amount of nucleic acid present in the tumour must be considered as the fundamental cause of increased division rate *and malignancy*, it must be pointed out that neither observation nor experiment supports the view that increase in division rate is a criterion of malignancy. Thus the increase in weight of a host from that of a single cell to 8 lb. in 9 months far exceeds that of any tumour, together with its metastases, which is likely to develop in a corresponding period of postembryonic life. Increase in division rate occurs under many physiological and pathological conditions; among cancerous growths it is not outstanding. Perhaps Koller should reconsider the problem of malignancy on this basis.

1. Scientific Reports of the Imperial Cancer Research Fund, 1905 to 1912.
2. *Lancet*, 1939, ii, 797, 1942; i, p. 323.
3. Koller, P. C. *Nature, Lond.* 1943, **151**, 244.

PSYCHIATRIC SEQUELÆ OF PERTUSSIS

CEREBRAL changes during pertussis are well known, but it has never been established beyond doubt that the infection is a precursor of late sequelæ unassociated with any symptoms at the time of illness. Lurie and Levy as the result of their study of a large group of children at a Cincinnati child guidance home are of the opinion that such late sequelæ do arise. They found that of 500 children referred to them for behaviour disturbances 243 gave a history of pertussis; 58 of these had had the infection during the first two years of life. Only these 58 children were subjected to intensive study, but the figures for other age-groups are noteworthy: 60 were between two and five years of age and 41 were over five at the time of infection, the date being unknown in the remainder.

In 34 of the 58 children attacked in infancy Lurie and Levy hold that "there appeared to be a definite relationship between the neurologic sequelæ of the whooping-cough and the behaviour disorders and personality changes shewn by them later in life." The children were examined at ages ranging from four to seventeen. Their symptoms were somewhat diverse, most of them exhibiting delinquency and incorrigibility, while a smaller number had school maladjustments and neuroses. A surprisingly large number (25) of these children presented abnormal physical signs in the nervous system, both in the pyramidal and extrapyramidal tracts, while nerve-deafness was found in 15. Of the 34, 10 were classed as feeble-minded and 9 as of subnormal intelligence. The authors claim that in all these cases other possible causes, including hereditary influences and birth-trauma, had been excluded; but some will doubt the possibility of such wholesale elimination, since the effects of prenatal disease and natal trauma have not always become manifest before the ages at which these infants were infected—in most cases as early as 3–7 months. To correlate these late symptoms with what is known of the neurological complications of pertussis is difficult. It is not clear whether the authors attribute them to a manifest encephalopathy suffered during the illness or to an insidious process unrecognisable at the time. In discussion Lurie admitted that the histories contained no evidence of neurological examination or symptoms. The pathology of "whooping-cough eclampsia" is so varied that Ford has expressed doubt as to its existence as a clinical entity, but three characteristics seem to have met with fairly general acceptance: it occurs in a very small percentage of cases; it is almost entirely confined to infants; and it is usually fatal. It seems unlikely that a sufficient number of these infants would have survived to develop the sequelæ observed by Lurie and Levy. Moreover, of the total number of children with a history of pertussis only a minority were infected in infancy; far more were attacked at ages at which

1. Lurie, L. A. and Levy, S. *J. Amer. med. Ass.* 1942, **120**, 890.

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the encephalopathy hardly ever occurs. The recovery-rate of this complication, however, is not easy to determine because a mild attack may present no clear clinical features. In infancy a few fits may accompany any infectious fever, and in the absence of focal signs the existence of a true encephalopathy can only be recognised by examination of the cerebrospinal fluid. But it seems unlikely that the cases described had suffered from a pertussis encephalopathy; if their subsequent psychopathic development was directly due to pertussis, it possibly resulted from more insidious cerebral damage which impaired mental stability. If a causal relationship between whooping-cough and behaviour disorders should be proved it would introduce new factors of far-reaching importance in their ætiology and prognosis, but proof is not forthcoming from this investigation.

THE RED CROSS PAST AND PRESENT

IN a paper read before the history of medicine section of the Royal Society of Medicine on April 7, Dr. A. P. Cawadias pointed out that the basis of the Red Cross movement is essentially utilitarian and not humanitarian. In war there is little chance of your enemies giving special attention to your soldiers, wounded and prisoners, who are in their hands, unless they can be sure that their own wounded and prisoners will have similar treatment. The red-cross principle really consists in the neutralisation of the wounded and of the doctors, nurses and hospitals. In a way the Knights of St. John were precursors of the movement: the *fratres hospitalarii* were essentially warriors, but they found care of the wounded a relief to their conscience. The real beginning, however, was due to the Genevese, Henry Dunant. In his *Recollections of Solferino* (1862) he set out principles which are still fundamental: the neutralisation of the doctors and wounded, as well as the hospitals, so that the wounded of all belligerents may be treated alike; the use of a special emblem; and the creation of relief societies in all countries to provide care for the wounded, regardless of nationality. He proposed that a congress should be held to lay down a "sacred principle." This book had a great success, and Dunant's vision, combined with the driving power of Gustave Moynier, led to the formation of the first Red Cross Committee on Feb. 17, 1863, and afterwards to the first international red-cross agreement.

The Red Cross had its baptism of fire in 1866 during the German-Austrian war: in the forest of Horowitz 383 Austrian wounded were saved from death by Breslau students and doctors acting on Red Cross principles. It was also active during the Franco-Prussian war, and soon sick persons were put in the same category as wounded. By the activity of Henri Dunant prisoners of war were in 1872 placed under the supervision of the diplomatic corps, and civilian victims of war were later included, also at his instigation. Today there are 57 national Red Cross Societies, and the international committee in Geneva serves as an umpire and central organisation. The strain on the organisation during the present war has been tremendous. So far, said Dr. Cawadias, those who have suffered most have been civilians, and there has not been time to build up an organisation as effective as that for wounded and prisoners. In the future there must be a powerful international committee with permanent meetings. The governments of the nations must realise that the Red Cross is a band of persons with very definite plans.

In the course of the discussion Monsieur de Pourtales, of the International Red Cross, emphasised that the movement should be free from all political considerations. The work in Geneva has grown to enormous proportions. It now employs over 3000 persons, and up to last December they had received 20,000,000 letters and had sent out 19,000,000. A card-index, containing 15,000,000 cards, has been built up relating to missing persons. M. de Pourtales spoke well of the condition of prisoner-of-war camps in this country, and Dr. E. Ashworth Underwood referred to difficulties which had arisen over the indiscriminate use of the red-cross emblem. Mr. P. G. Cambray said that the biggest developments in the present war were in relation to the civilian populations to parcels of food, clothing and books, and to the postal, message scheme. In his reply Dr. Cawadias urged that the partial cessation of Red Cross activity which followed the last war should not be repeated this time.

EPIDEMIC KERATOCONJUNCTIVITIS

IN 1941 an epidemic of keratoconjunctivitis occurred in the shipyards of San Francisco which later spread throughout the pacific coast of America and incapacitated several thousands of workpeople.[1] It was thought to have come from the Hawaiian Islands, where a similar epidemic had been raging. After an incubation period of 2–5 days the patients experienced pain, excessive lacrimation, and a gritty feeling in the eye. Examination revealed an acute follicular conjunctivitis with scanty exudate and an enlarged tender preauricular gland. If the cornea was not involved, the disease was usually self-limiting and lasted 2–3 weeks. But if, as happened in half the cases, the cornea showed superficial infiltration, the condition was unlikely to subside for 6 weeks, leaving in many cases some permanent defect of vision. The disease was obviously contagious, but for some time no organism was grown from the conjunctival sac. Now Sanders and Alexander[2] have produced experimental evidence that a virus is the cause. This virus could be inoculated into mice and subsequently retransmitted to a human volunteer with the production of a typical eye lesion. In 1942 there was an outbreak in New York and additional information about the disease was collected by Sanders and others[3] from 80 patients who visited an oculist in that city. It was found that half of this number developed corneal infiltrates and these still persisted 6 months later when other signs of the disease had disappeared. In nearly half the patients the opposite eye was subsequently affected. They also confirmed previous findings about the causation of the condition and were able to maintain the virus through fourteen tissue-culture generations. No epidemic has yet arisen in British shipyards, but sporadic cases have been reported and it is necessary to be on the watch for these in order to isolate them. Treatment has so far proved unavailing, and all the usual ocular antiseptics have aggravated the symptoms without curing the disease. The best treatment at present seems to be a boracic eye wash coupled with sodium sulphacetamide ('Albucid soluble') eye drops.

THE BUDGET

THE outstanding feature of last Monday's Budget is that taxation is to provide 56% of the £5158 million to be found. This compares favourably with 36% in 1940, 48% in 1941, and 52% in 1942, and very favourably with 29% in 1918. Money paid to the Government in revenue or loans cannot (we hope) employ labour to the country's disadvantage, and by its taxes and its savings campaign the Government ensures an increasing concentration on the war effort. To have achieved so high a concentration while maintaining—indeed improving—the standard of nutrition is a remarkable feat. Reformers will be disappointed, however, if they expect another 6*s.* a pound to abolish the national addiction to tobacco; indeed smokers seem to have acquired immunity from increasing doses of taxation.

1. Sanders, M. *Arch. Ophthal.* 1942, **28**, 581.
2. Sanders, M. and Alexander, R. C. *J. exp. Med.* 1943, **77**, 71.
3. Sanders, M., Gulliver, F. D., Forchheimer, L. L. and Alexander, R. C. *J. Amer. med. Ass.* 1943, **121**, 250.

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Special Articles

DIEPPE IN RETROSPECT

J. A. MACFARLANE, F R C S E
COLONEL, CONSULTING SURGEON, CANADIAN OVERSEAS MILITARY HEADQUARTERS

THE casualties in the Canadian forces resulting from the Dieppe raid presented peculiar difficulties of organisation, evacuation and treatment. It was never possible to establish ambulance collecting posts on the beaches. Medical officers accompanied battalion formations and did admirable work throughout the morning in giving first-aid and directing the evacuation of wounded to points on the beach. From this point they were put aboard tank-landing or other small craft. During this evacuation, they were under vicious cross fire from enemy machine guns, rifles and mortars. During the operations on shore there was little time to carry out more than casual first-aid, and indeed many men were wounded while crossing the strip between the breakwater and the beach itself.

Sulphonamides were not used on the beaches, but wherever possible during the voyage home and in collecting posts on the English side of the channel. The casualties came into two main points on the British coast and were evacuated as quickly as possible to Canadian hospitals. Sulphonamides had been used locally in not more than 30% of cases before admission. In all hospitals oral administration was begun immediately after admission and in 92% of cases some type of "sulpha" drug was used at the time of operation. Sulphanilamide was the most generally used drug as a local application while sulphapyridine and sulphathiazole were the common drugs given by mouth.

Tetanus.—All Canadian military personnel are immunised against tetanus with tetanus toxoid. In this operation antitetanic serum was given in only 6% of the wounded. Indeed, in the vast majority of cases neither toxoid nor serum was given, yet no clinical tetanus developed in the whole series of about 600 men.[1] The policy to be followed in the Canadian forces depends on active immunisation and a boosting dose of toxoid after wounding. This policy had apparently not been sufficiently clarified at the time of the Dieppe raid and this fact accounts for the varying actions taken in relation to tetanus prophylaxis.

Resuscitation measures, including transfusion with blood or blood substitutes, were used in approximately 10% of the cases. This includes a number of cases in which transfusion was carried out, during and after extensive operative procedures. In at least one of the craft which carried casualties on the return voyage transfusions with dried serum were carried out on board by the medical officers. They were impressed by the prompt improvement in these severely shocked cases. The success of transfusions carried out on a small craft intermittently under heavy enemy attack clearly demonstrates that shock can be treated with blood derivatives under the most adverse circumstances in the forward area.

Anæsthesia.—Of the 346 patients who required anæsthetics for necessary operative procedures, inhalation anæsthesia (ether, gas and oxygen, or cyclopropane) was used in 127. 'Pentothal Sodium' was given intravenously in 183 cases, and pentothal with inhalation of nitrous oxide or cyclopropane in another 23. Spinal anæsthesia was used in 6 cases and local infiltration in 7. The large number of cases in which pentothal was employed is a tribute to the usefulness of this agent where many casualties have to be handled quickly. No untoward incident occurred as the result of the administration of any anæsthetic. The surgeons of the various hospitals were impressed with the value of pentothal as a safe and effective anæsthetic for casualties in which the operative procedures were of relatively short duration, notably attention to extremity wounds.

WOUNDS OF THE HEAD, ABDOMEN AND CHEST

Head Wounds.—Seven relatively severe penetrating wounds of the skull were evacuated. All were subjected to operation for removal of fragmented bone, pulped brain and readily accessible metallic bodies. Sulphonamides were used locally and the wounds closed. All wounds healed by first intention. One patient died after 6 days; all the others recovered. Two were returned to duty; the others will be unfit for service.

Abdominal Wounds.—Thirteen penetrating abdominal wounds were brought back from Dieppe. The time between wounding and admission to hospital ranged from 20 to 36 hours. Of these cases, 6 were judged too ill for any operative interference. Two of these were severe thoraco-abdominal wounds which are noted as fatal in the survey of chest wounds. Five died within a short time of admission. One recovered and developed a pelvic abscess some days later; this was drained and his further recovery was without incident. The 7 remaining cases were subjected to operation after suitable resuscitative measures; of these, 3 lived and 4 died. The recoveries are as follows:

(1) Admitted after 30 hr. Found to have several perforations necessitating resection of 3 feet of small bowel.

(2) Perforations of descending colon. Drainage and establishment of fistula in colon. Spontaneous closure in 3 weeks.

(3) Perforation of descending colon; colostomy and drainage of abdomen.

Three others might well be considered with the abdominal cases although the perforations of viscera were extraperitoneal. These were 2 cases of perforation of the rectum, and 1 of perforation of the bladder; all three recovered.

The mortality in these cases—9 out of 16—is high, though perhaps not higher than might be expected considering the time which elapsed before they reached hospital and the trying and difficult journey across the channel. Five died without operation. The abdominal wounds made up 2·7% of the total number of wounded. They can be summarised as follows:

	Cases	*Deaths*
Too ill for immediate operation	6*	5
Immediate operation	10	4
Small bowel	2	1
Large bowel	4	2
Liver	1	1
Rectum	2	0
Bladder	1	0
Total	16	9

* One later developed a pelvic abscess which was drained and the patient recovered.

Penetrating Chest Wounds.—Thirty soldiers with penetrating chest wounds were returned (5% of total wounded). Of these, 3 were severely wounded men with complicating abdominal and other injuries and they died shortly after admission. The remaining 27 all survived, and with fairly encouraging final results. A review carried out ten weeks after their admission revealed that 11 had been returned to ordinary duty and a further 5 will shortly be fit for duty. Two have been regraded for limited service and 9 as unfit for further service. Of those requiring regrading, 7 were disabled by wounds elsewhere than the chest—head injury, spinal-cord injury, fractures and the like. Apart from the cases with other incapacitating lesions the final review of penetrating chest injuries in this small series provides a reasonably satisfactory picture—complete restoration to active duties in 50% and return to limited services in 25%.

Discharged to ordinary duty	11
Soon fit for duty	5
Recategorised for limited service	2
Unfit for further service	9
Died	3
Total	30

Operative procedures involving the soft tissues only (excision of wounds) were required in 12 cases. In 3, more extensive procedures involving the removal of ribs and foreign bodies were necessary. In no case was it necessary, nor did it seem wise, to operate on the lung. Foreign bodies in the lung are retained in 9 cases.

1. No cases of tetanus have been encountered in the Canadian Armies Overseas since their arrival in Britain.

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Hæmothorax was present in 15 cases; unilateral in 14 and bilateral in 1. Treatment of hæmothorax was by early aspiration and in many cases by air replacement. Aspiration was repeated at least once in all the cases and occasionally four or five times. The only empyema developed in a case in which a hæmothorax of considerable size was left for ten days without aspiration. Open pneumothorax was encountered in 4 cases; 3 of these men had large wounds complicated by abdominal and other injuries and died soon after admission. Tension pneumothorax occurred in 1 case and closed pneumothorax in 8 cases. Hæmatoma of the lung was diagnosed in 17 cases. Two cases suffered mediastinal injury but neither developed active infection.

In all the hospitals, chest injuries were seen by medical specialists in consultation with the surgeons immediately after admission. Indeed, the major responsibility for their care was deputed to the medical division. Only by very active coöperation between physician and surgeon can the best results be achieved.

COMPOUND FRACTURES

A high proportion of the casualties suffered compound fractures of the extremities. Of 117 cases, constituting roughly 20% of the total wounded admitted, it has been possible ten weeks later to review 100. The more trivial cases have been omitted from the series. The interval between wounding and operation averaged 32 hours. In spite of exposure and makeshift temporary splinting the general condition on admission was surprisingly good; less than 10% required transfusion. The incidence and distribution of the major complications are set out in table I.

TABLE I—MAJOR COMPLICATIONS IN 100 COMPOUND FRACTURES ON ADMISSION

	Hand and wrist	Forearm	Arm and shoulder	Upper extrem. Total	Foot and ankle	Leg	Thigh and hip	Lower extrem. Total	All cases
Extensive soft-tissue damage	5	13	22	40	13	15	11	39	79
Involving joints	7	8	3	18	9	5	5	19	37
Permanent peripheral nerve injury	0	2	8	10	2	4	0	6	16
Infection already established	1	3	1	5	2	5	3	10	15
Gas gangrene present	0	1	1	2	0	1	2	3	5
Total major complications	13	27	25	75	26	30	21	77	152

TABLE II—TREATMENT APPLIED IN 100 COMPOUND FRACTURES

Amputation	2	2	1	5	3	3	0	6	11
Wound excision	9	15	22	46	11	17	11	39	85
Plain gauze filling	3	2	4	9	1	1	3	5	14
Vaseline gauze or tullegras	7	13	18	38	11	16	8	35	73
Closed plaster	8	14	16	38	13	16	10	39	77
Sulphonamides: locally	8	15	22	45	11	18	8	37	82
by mouth	10	17	23	50	15	19	11	45	95
by vein	0	0	0	0	1	0	0	1	1

The vast majority of the wounds had been caused by metallic fragments of shell or mortar casing. A small wound of entry often concealed extensive soft-tissue and bone damage. A few resulted from rifle or machine-gun bullets, and in these the disruption of the limb was much less severe. Extensive soft-tissue damage was recorded in 79 cases. There were 37 instances of joint involvement and 16 of serious peripheral-nerve injury. Peripheral-nerve damage was particularly noted in the upper arm. Complete radial paralysis was observed in 8 of the 19 cases of compound fracture of the humerus. Gross wound infection was apparent at the time of operation in 15 cases, of which 5 presented clinical evidence of gas gangrene.

Treatment.—The general management was fairly uniform in the five base hospitals and the treatment applied is summarised in table II. Amputation was necessary in 11 cases, 5 in the upper extremity and 6 in the lower. Of the remaining wounds all but 4 of the most trivial were subjected to surgical excision. This procedure followed the rules laid down by Trueta—adequate exploraton by longitudinal excision, decompression of fascial spaces, evacuation of hæmatomas, and the removal of dead tissue and easily accessible foreign material. The wounds were packed with 'Vaseline' gauze or plain gauze, the latter being apparently the less popular of the two.

Foreign bodies were removed when easily accessible but no long search was made for them. In retrospect, if there had been sufficient time it might have been desirable to remove a greater proportion of foreign bodies, particularly those in relation to bone, but it is manifestly unsound when faced with a rush of casualties to spend valuable time in seeking foreign bodies that are only evident by X-ray examination.

Immobilisation by complete enclosure in skin-tight plaster was effected in 86% of the cases, and continued to be used as the method of fixation throughout their convalescence. By the end of ten weeks it had been necessary to change these plasters on the average three times in each case. In a great many cases one or two changes sufficed to complete their treatment. Of the fractures not immobilised by circular plaster, 2 were treated by skeletal traction, and the remainder, usually of the wrist and hand, on plaster slabs. In no case was internal fixation used. Chemotherapy during and after operation was widely used; by local application in 82%, by mouth in 95%, and intravenously in one case. Serious as opposed to trivial infections, developed in 12 cases. There was no instance of postoperative gangrene. Secondary hæmorrhage occurred in one case—a compound fracture of the humerus, complicated by extensive soft-tissue injury.

Bone healing was complicated by osteomyelitis in 9 compound fractures; 3 in the upper and 6 in the lower extremity. Of these, 1 was incompletely excised at the time of the original operation because of the patient's poor general condition; in 3 others the infection developed in the tarsus, metatarsus or phalanges; and in 1 the ilium became infected in a wound which traversed it and then entered the rectum. Union has been delayed abnormally in 3 additional cases.

Disposal.—At ten weeks after admission to hospital, it is impossible to arrive at any conclusion as to final results. Twenty of these 100 patients have now been returned to duty; 26 are definitely unfit for further active service. Of the remainder, perhaps 19 may be expected to return to active duties, and another 35 will be fit for duty in limited service. There were no deaths in the series; fat embolism was not noted.

SOFT-TISSUE WOUNDS

Of the soft-tissue wounds, 97% were explored, and varying degrees of excision and drainage carried out. Nearly all of these were left open and then packed. Some sulphonamide drug was used locally in all cases. A relatively small number were immediately enclosed in plaster because of pressure of work, but many of the large soft-tissue wounds were immobilised after three or four days. One was impressed by the much greater degree of comfort and general well-being of those men who were immobilised. Where plastering had been delayed there were a few instances of troublesome growth of maggots under the plaster later. This may have been due to the easy access of flies to the wound before it was covered completely. Maggots were in no way a detriment to progress of healing, but a great source of annoyance and discomfort to the patient. In a few cases secondary suture was carried out at the end of two weeks, with some success. Skin-grafting was employed notably in cases where large defects of skin resulted from radical attacks of gas gangrene. Generally speaking, skin-grafts are more useful than secondary suture in those cases where the open treatment of soft-tissue wounds has resulted in a large flat granulating surface.

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GAS GANGRENE

Thirteen cases of gas gangrene infection occurred in 580 patients. The time interval between wounding and surgical intervention averaged 31 hours. Muscle damage was assessed as "extensive" in 7 and "considerable" in the remaining 6. Associated muscle injury was assessed as slight in 8, moderate in 2 and severe in 3 cases. In every case except one the diagnosis was apparent on clinical examination. Radical local excision was the method of treatment in 6 cases. Sulphonamides were used locally and by mouth, and the limb was immobilised in plaster in all cases, 3 immediately and the others after an interval of two or three days. Amputation was required in 6 cases, 4 thigh and 2 below knee. The procedures used were 2 guillotine and 4 open flaps. In 2 cases probably, and certainly in one of these, the amputation was necessary because of ischæmia rather than the extent of the infection. Anti-gas-gangrene serum was not used. The one fatal case was the result of gas gangrene of the abdominal wall. This man on admission had foul-smelling discharge pouring from what appeared to be a penetrating wound of his abdomen. It was judged to be a fæcal fistula and no other treatment than intravenous fluids and sulphonamides was given. At the autopsy extensive gas gangrene of the abdominal wall and liver was demonstrated. No cases of gas gangrene developed after operation on any of the casualties admitted. The case-fatality in the small series was 7·6%; related to the total number of casualties received the mortality was 0·17%.

PERIPHERAL NERVE INJURIES

Thirty-five fairly serious nerve injuries were encountered, the distribution being: musculospiral 13, median 3, ulnar 12, sciatic 3, and peroneal 4. For the most part they were associated with compound fractures. In a few cases the nerve ends were brought together by one or two sutures so that they might more easily be found at a later exploration, but generally no attempt was made to isolate or repair the lesion. Sulphonamides were used locally in wounds which involved peripheral nerves. Recent reports indicate that nerve trunks bathed in a high concentration of a sulphonamide may suffer severe and lasting damage. It would seem wise, therefore, at least until this subject is further clarified, to refrain from the use of any sulphonamide in a wound which exposes a peripheral nerve trunk. As soon as possible, a careful note of sensory and motor loss should be made by the surgeons on a special chart, and the changes that occur should also be carefully noted. The recording of such observations immediately after the injury will be of the greatest value to the surgeons (often in Canada), who some months later will be called on to review the case and decide on further explorations.

RESULTS IN WHOLE SERIES

The total mortality for all the wounded which were admitted to hospitals was 2·5%. Seven cases were admitted in extremis and 8 died after operation; 16% of the cases were discharged during the first week and a further 14% at the end of the second week.

SUMMARY

Among some 600 Canadian casualties from the Dieppe raid admitted to hospital the mortality was 2·5%.

In chest wounds conservative treatment has given reasonably encouraging results. Little radical surgery is required. The importance of repeated aspiration is borne out. In all hospitals it was of the greatest value to have the active coöperation of the medical specialists in this group of cases.

Mortality in abdominal wounds is directly related to delay in reaching the surgeons.

The incidence of serious wounds of the extremities is high but is comparable to figures from other theatres of war. The experience in this group of cases confirms the value of the principles laid down by Trueta—wide exploration and debridement; packing the open wound; immobilisation and infrequent dressings.

The preparation of this paper has only been made possible by the coöperation of all the hospitals concerned. Captain D. W. MacKenzie, RCAMC, has been responsible for the final compilation of the clinical data which form the basis of this report.

HEALTH IN INDUSTRY

THE LONDON CONFERENCE

LAST week-end an official conference on industrial health was held in London. In his opening speech on April 11, Mr. ERNEST BEVIN (Minister of Labour) said it had been called to stimulate and crystallise the widespread interest in the subject. The Factory Department had struggled long and honourably for the health and safety of the workers. How best could its work be extended and improved; how could coördination of the medical services be ensured; how should the general practitioner's knowledge of industrial conditions be increased; and how far could the professional and technical staffs of industry contribute towards solving the problems of industrial ill health? This was the concern not only of doctors but also of engineers, chemists, physicists, personnel managers, and of course employers and trades-unions; most important of all, it was the concern of the workers themselves. If we were to rebuild the nation and re-establish our place in the world we could not afford accidents and illness, any more than we could ever afford unemployment again.

INDUSTRY AND A COMPREHENSIVE MEDICAL SERVICE

Mr. ERNEST BROWN said that health was one and indivisible; as Minister of Health he thought of each industrial worker as a member of the general community. The present need was to bring all the medical services together in a simple and sensible pattern so that they formed a full health service for the nation. He wished to preserve the family unit as the basis of a national health service. He thought that the same doctors who looked after the family could do part-time service in the factories.

Mr. JOSEPH WESTWOOD (parliamentary under-secretary, Scottish Office) referred to the Clyde Basin scheme. In 1942 general practitioners and works medical officers were invited to submit for specialist advice workers under 25 years old who appeared to be in poor health or who needed convalescent treatment. The scheme had been a success, and had now been extended to cover patients of all ages. A second experiment involved the study of 1000 workers invalided out of the Services. If left to themselves, these workers did badly, but if sent to training centres, where their capabilities and needs were studied sympathetically, many of them got back almost to full productive work. Social, medical and occupational difficulties were closely interrelated.

Mr. TOM SMITH (parliamentary secretary, Ministry of Fuel and Power) referred to the white-paper on coal which made a recommendation, long overdue, for the establishment of an adequate medical service for the mines. One additional doctor at headquarters had now been appointed, and 5 out of 8 other regional appointments had already been filled. As regards rehabilitation of miners, rapid progress had been made. At Gleneagles 200 beds were available for injured mine-workers, and six other centres were being set up. Mining was a hard and a dangerous industry. Real progress has been made in South Wales in dealing with pneumoconiosis, and a broader definition of silicosis would allow all cases to be brought under the compensation schemes.

Sir WILFRED GARRETT (HM Chief Inspector of Factories) described how the staff of the department works as a team. The doctors made a diagnosis; the engineers, chemists or physicists were then called in, and after a full investigation the results were handed back for application by the district inspector of factories who was responsible in law. New ground had been broken when the department was transferred to the Ministry of Labour and under the stimulus of Mr. Bevin's enthusiasm definite advances had been made. Sir Wilfred referred to the Medical and Welfare Services Order, the various Canteens Orders, the luminising regulations and the accident prevention campaign undertaken in association with the Royal Society for the Prevention of Accidents.

Sir WILSON JAMESON (chief medical officer, Ministry of Health) in paying tribute to the work of the Factory Department said that in recent years the total number of cases of industrial disease notified annually had been less than half the number of the cases of lead-poisoning alone that were notified in 1900. All work in preventive

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medicine required a group of workers of whom only some need be medically trained. He looked forward to the time when all young people would be periodically examined by mass radiography. If people were to be truly healthy, they must be happy, and in industry as much thought must be given to the comfort of the workers as was given to the machines. He hoped the present dispersal of factories in country sites had come to stay. He believed the measures now taken for feeding the population in communal feeding centres, schools and factory canteens had been largely responsible for the lowest infant-mortality rate, and the second lowest death-rate on record. He hoped, too, that industry would help in educating the public. Medical students should be taught social as well as clinical medicine; and he thought that in a comprehensive service preventive work would be taken over by the family doctor who should be encouraged to prepare himself also for work in the factories. Apart from specific occupational hazards, factory-workers were liable to the same ills as the other members of the community and they died from the same causes.

Dr. M. W. PATERSON (secretary, Association of Certifying Surgeons) surveyed the part which certifying (now called examining) surgeons have played in promoting industrial health since the passing of the first Factories Act some 100 years ago. The examining surgeons were mainly general practitioners of standing and experience who had become in effect industrial medical specialists. They were appointed to a district and not to one factory and therefore gained experience of many different trades. They wished to play their part in an enlarged medical service for industry. There was room for both part-time and whole-time industrial medical officers, but there was a danger that a whole-time medical officer might be divorced from the home life of his patients. The problem of medical supervision of the workers in the smaller factories could be solved by appointing a doctor in charge of a number of them. There was a nucleus in the country of some 2000 examining surgeons, who were already interested in industrial health.

RESEARCH AND PREVENTION

Sir EDWARD MELLANBY, FRS (secretary of the Medical Research Council) spoke of the importance of research, without which medical treatment could not produce the best results. It was strange that after the Industrial Health Research Board had established the optimum hours of work for health and output, conditions should have been allowed to get badly out of hand. The small band of workers employed by the board had brought together a number of facts of great potential value to industry, and in their reports these facts were now available to anyone interested in factory conditions. In future two factors would have to be studied; (i) specific industrial hazards and (ii) the psychological problems of industry, particularly those connected with fitting the man to the job. Sir Edward was quite certain that the second group of problems was more important than the first, and he made it clear that only first-class psychologists should be appointed to do the work. He asked the Ministry of Labour to take up this question more seriously. The real research-worker was a rare person and his work should be surrounded by as much goodwill as possible.

Dr. E. R. A. MEREWETHER (HM senior medical inspector of factories) referred to the idea that industrial diseases constitute an insignificant part of all the diseases to which the industrial population is subject. In his view they were far from insignificant. It had been estimated that in the United States between half and one million people were exposed each year to silica dust. In this country the deaths from silicosis were about one-fifth of the number of fatal accidents in factories, mines and on the roads. Industrial diseases repaid attention because they could all be prevented.

MANAGEMENT

Brig.-General A. C. BAYLAY, speaking of the rôle of management in industrial health, said that the mental attitude of the worker had an enormous effect on his health. He emphasised the great value of tidiness and brightness ("call it eye-wash if you like") in making the workers happy and contented. If an employer thought of the worker as a member of his own family, he would appreciate that a factory inspector was not being pernickety or interfering when he asked for (say) a guard on a machine.

Mr. J. L. SMYTH mentioned a maxim of Sir Thomas Legge's in regard to industrial health—that the worker could do practically nothing until the employer had done practically everything. Dangerous chemical substances should not be used in industry unless their effect on human beings was known, and he suggested that the sponsors of these substances would do well to try them on themselves. Workers should not be placed in jobs until they were found to be mentally and physically fit for them, and it was more than ever necessary to make sure that managers were mentally fit to hold their positions. Works doctors must have the confidence and goodwill of the workers, and they must be fearless in pointing out to the management defects in the factory conditions.

THE WORKS DOCTOR

Dr. CHARLES HILL (deputy secretary, British Medical Association) spoke of the necessity of deciding how to carry over into peace some of the machinery set up in war-time to combat ill health—as for instance the factory medical and nursing services which had come into being under the stimulation of the Minister of Labour. He also dwelt on the need for health education which he defined as an intelligent and intelligible exposition by those who knew to those who wanted to know. He was glad that the Government was beginning to show courage in health education, but it was likely that the enlightened impulse for better health of the workers among boards of directors—stimulated no doubt by the Treasury with its Excess Profits Tax—would not endure after the war unless care was taken to see that it did. The factory medical services were not now satisfactory, because the smaller factories were not included in the scheme. Further the doctors were paid by the employers—a fact that roused some suspicion in the workers' minds that the doctor was the employer's man, and not theirs. While the medical service remained an employers' service it will be incomplete. The factory medical service must be a national one, and there should be no attempt to divorce the factory from the general environment. At present the MOH had the right of entry into factories only to deal with W.C's and fire escapes. In Dr. Hill's opinion one of the most pressing problems was the recasting of medical education.

Dr. R. E. LANE said that the works doctor must know the factory and its processes as well as he knew his own home. A casualty service was essential, and it should be staffed by suitably trained nurses. In addition there should be good first-aid services composed of first-aid men and rescue squads. The training of all these people was the responsibility of the works medical officer. Like other speakers, Dr. Lane emphasised that the works doctor should have nothing to do with compensation cases. Any health propaganda undertaken should be as tactful and as unobtrusive as possible. He regarded a health exhibition as an essential part of the education of the workers.

Dr. A. J. AMOR (deputy chief medical officer, Ministry of Supply) held that the factory doctor should be the leader of the factory health team which should include all those who dealt with any aspect of health, such as the labour manager, the welfare supervisor nurses, first-aid men, and representatives of the workers themselves. The doctor should know every worker by his or her christian name. He advised works doctors, if they wanted to study environmental conditions, to discard the university gown and sit at the machine all day. Factory conditions could not be studied from a beautiful surgery with chromium-plated fittings. He urged the doctors to get up at 5 AM, work a long day and travel the same distances as workers. Only then would they be able to talk with any authority about fatigue. In a Royal Ordnance Factory team work between the doctors, nurses, welfare supervisors and workers had brought about a 60% fall in the incidence of dermatitis.

TRAINING FOR INDUSTRIAL MEDICINE

Lieut.-Colonel G. S. PARKINSON (dean, London School of Hygiene) said it was impossible for the medical curriculum to include all the subjects that a doctor was

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expected to know, and postgraduate instruction was therefore a necessity. In future medical men and women going into industry should have a diploma of industrial health, but they should previously have spent at least two years in hospital appointments and some time in general practice. The latter was important because a doctor could not learn about men from books. Facilities for training industrial medical officers—the courses being controlled by the General Medical Council—should be provided at centres throughout the country.

MEDICAL SERVICES IN INDIA

THE IAMC

THE growth of the Indian Army during the war has called for a large increase in its medical services, which has been met by voluntary recruitment of doctors and personnel. The services required for British troops in India are provided by the War Office from the Royal Army Medical Corps, but no such homogeneous corps has hitherto existed for Indian troops. The medical requirements of the Indian Army have been met by the Indian Medical Service, the Indian Medical Department (a subordinate medical service of Indians and Anglo-Indians), and the Indian Hospital Corps which has found the clerks, nursing orderlies and other ancillary services.

THE EXISTING SERVICES

The *Indian Medical Service* dates back to the days of the John Company, whose doctors, often taken from East Indiamen, were responsible for civil duties but also found the medical aid required in the many wars in which the company were engaged. Though this service is now primarily military and is at present medically responsible for personnel of the Indian Army, the Royal Indian Navy and the Indian Air Force, its civil side has always been important and has always attracted candidates with high qualifications. It has been responsible not only for the provision of medical aid to the civil population but for medical education, public health, research, gaol administration, and many other services in which a scientific training is necessary. The present satisfactory position of medical education in India owes everything to officers of the Indian Medical Service, who founded the original medical colleges and until recent years provided most of their teachers. Many of these officers have played a distinguished part in investigations which have advanced knowledge of the causation and treatment of diseases, especially those peculiar to the tropics. Indians have always been recruited to the service, and of late their numbers have increased rapidly with the rising popularity of the profession of medicine among educated Indians.

At the outbreak of war the Service had 780 members, of whom 60% were European. Since then a large number of doctors have been granted emergency commissions, and the total on Feb. 1 of this year was 2838, of whom only 20% were European. They include a few women, both British and Indian.

The *Indian Medical Department* is a subordinate medical service consisting of two branches, the British and the Indian.

Recruitment to the British cadre is restricted to domiciled Europeans and Anglo-Indians, who are ordinarily employed for service with British troops only. Members of this branch pass through a 5 years' course at one of the Indian medical colleges and obtain a diploma which permits them to practise as doctors in India. Since 1934 all entrants to the British cadre have been required to take the full course for the MB, BS degree of their Indian university, which would entitle them to British registration. Others have taken advantage of study leave and have secured a British medical qualification in the United Kingdom.

The Indian cadre of assistant surgeons succeeded the hospital-assistant cadre created as early as 1822, and the sub-assistant surgeon. Its members are employed to assist IMS officers in the care of Indian troops. They have a 4 years' course at a medical school and are required to obtain the diploma of LMP (licentiate) which entitles them to register and practise as doctors in India. Formerly licentiates received a very limited training, but more recently the standard at the medical schools has consistently improved, and many of these licentiates are skilled doctors who compete successfully in civil life with university graduates.

In the Army members of the Indian Medical Department, both British and Indian, are employed on subordinate duties, and do not usually hold any independent medical charge.

The personnel of *Indian Hospital Corps* are intended to undertake the duties performed in the RAMC by non-commissioned officers and men. It is organised for duty in hospitals, laboratories, medical stores and field medical units, and has been greatly expanded during the war.

NEW DEVELOPMENTS

The British medical profession still provides a proportion of officers of the Indian Medical Service. Towards the end of last year a special mission was appointed by the Secretary of State to visit India, to discuss the supply of medical personnel for the Forces, and to make recommendations as to the numbers of doctors required from the United Kingdom and the best use of such resources as are and can be made available. This mission, which consisted of Mr. H. S. Souttar, surgeon to the London Hospital (chairman), Lieut.-General A. Hood, director-general of Army Medical Services, Major-General Sir E. Bradfield, IMS, medical adviser to the Secretary of State for India, and Lieut.-Colonel J. T. Robinson, RAMC, recommended that a homogeneous medical service on the lines of the RAMC should be formed in India, and this recommendation has been adopted, as announced on p. 448 of our issue of April 3. They considered that the members of the Indian Medical Department were capable of undertaking responsibility as medical officers, and that they might at once be given commissions in the new corps, to which are also to be transferred all members of the Indian Hospital Corps, with improved arrangements for recruitment, training, and promotion. The formation of such a corps has been recommended before, though mainly with the idea of improving the standing and prospects of the medical officers. The aim of the new corps is to provide a really homogeneous service in which the other-rank personnel will play an important part.

The Indian Medical Service itself has long traditions and important civil responsibilities which could not be altered without prejudicing the future policy of any Indian government. Decisions as to its future are therefore being left till after the war; but meanwhile there would be nothing strange in officers of the Indian Army Medical Corps performing the duties hitherto performed by the IMS. It has therefore been decided that the members of the IMS will for the present be seconded and will serve as officers to the IAMC, without prejudicing any arrangements which may be finally reached. The new corps has been constituted in India as from April 3, 1943.

The Indian Military Nursing Service is the nursing service for the Indian Army with responsibilities comparable to those of the QAIMNS in the British Army. The numbers of trained nurses in India are limited, but improvements have been made to the Service during the war, and this has been helped by the employment of partially trained women as the Auxiliary Nursing Service.

BURROW HILL COLONY TO CLOSE.—The National Association for the Prevention of Tuberculosis has decided that owing to the difficulty in obtaining nursing and domestic staff the colony for boys at Burrow Hill, Frimley, Surrey, will have to be closed in three months' time. This colony has some eighty beds for the treatment and training of tuberculous youths.

NAVAL MEDICAL COMPASSIONATE FUND.—A meeting of the subscribers of this fund will be held at 3 PM on April 30, at the Medical Department of the Navy, 64, St. James's Street, London, S.W.1 to elect six directors.

MIDDLESEX COUNTY MEDICAL SOCIETY.—A meeting of this society will be held at 3 PM on Tuesday, April 20, at Staines County Hospital, Ashford, when Dr. A. G. Signy will speak on the macrocytic anæmias, and Dr. Donald Court on the health of nurses.

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CURRENT PSYCHOLOGICAL PROBLEMS

AT the annual general meeting of the British Psychological Society, held at Oxford on April 8–12, a wide range of subjects came under review. Among these was a symposium on

MENTAL ATTITUDES IN TIME OF WAR

Mr. R. H. THOULESS, PhD, said that the hatred of the enemy which is serviceable for the ends of waging war, may be detrimental to the ends of peace. It arises as a result of the war situation; and though its roots are largely unconscious, this does not mean that it cannot be dealt with at the conscious level. To think calmly and objectively about the war situation helps to weaken the irrational force of the sentiment.

Prof. T. H. PEAR discussed the psychological implications of re-educating the Germans. The assertion that after the war the Germans must be re-educated, he said, raised the questions: Which Germans? How? And by whom? Nazi youth might be a nasty bit of work, but he was a bit of work, and that work was planned. He condemned the use of theatrical descriptions of Germany as a "butcher bird" or "mad dog." No psychologist, he believed, would claim that the Germans have any special innate tendency to cruelty which members of no other nation possess. A particular type of education seems to have been entirely responsible for the effects on Nazi youth. It is just conceivable that a relatively larger number of Germans than of other civilised races have inherited a temperament conducive to learning the technique of cruelty; but selective breeding to that end would take a long time and would so far have produced no children over the age of ten. A tendency, say, to anger might certainly express itself in cruelty if trained to that end, or merely in sports like boxing and football which can be admired. He suggested that Allport's doctrine of drive, later modified by attitudes, sentiments and complexes explained the facts better than any appeal to the theory of instincts. Allport considers that known facts about the animal instincts only confuse the issue because there is such flexibility in human learning and breaking of habits, and so much insight, foresight and delay in responses, that human goals are of a different type from the stereotyped goals of animals. In the process of maturing, the dispositions of childhood coalesce into sharper, more distinctive systems of motivation. As they emerge these systems take upon themselves effective driving power and operate as autonomous motives, different in aim and character from those of juvenile years and very different from the crude tensions of infancy. He deprecated the spatial metaphors in psychology, in such phrases as "the layers of the mind," "the depth of aggressive instincts," "the cultural and therefore more superficial aspects of the individual in relation to society." A pattern of activities which may begin because prompted by some comparatively primitive incentive may set up strangleholds in their own right: stamp-collecting and bridge, he said, were good examples. The mathematician who works on precision aiming is not in a blazing rage. In war many motives other than unconscious ones are harnessed by authority. The desire for money or fame, the wish to avoid disapproval from those one loves or respects may be conscious and yet inspire difficult feats.

Dr. RANYARD WEST, considering the question "What ought we to think?" pointed out that if mental attitudes are classified into three types—neuropathic, racial national, and human—our most precise knowledge at present is about the first. Our information about war reactions that are purely human will have to be collected in peace-time; and racial national characteristics continue to elude assay. He quoted Berg: "I do not know the method of drawing up an indictment of a whole people." The obsessional type of character makes a peculiar contribution in war-time. Obsessionals are aggressive; they are largely responsible for the work of the world; and according to Freud obsessional mechanisms are the source of all civilisation. Their aggression finds an acceptable outlet in war: they can work and hate, keeping the two separate; and their emotional preoccupation with sadism finds scope in the horrors of war. Once war is joined obsessional mechanisms of thought and feeling probably become more widespread in the population than in time of peace. Prejudice is a judgment of fact distorted by emotion, and racial prejudice has been analysed by Stratton into a mere group prejudice: the enemy seems to be attacking the interests of the group as they appear at the moment. But he reminded the meeting that history, as studied by the enemy, was based on a different set of facts from those we have learned. We and our enemies are judging our relationship from two totally different sets of facts. Though it is in the nature of things for man to think wrongly, it is something if we can recognise the process.

SUGGESTIBILITY

Mr. H. J. EYSENCK, PhD, reported on a study of suggestibility by a variety of standard tests. In the "body-sway" test the subject is asked to shut his eyes and is then assured repeatedly that he is beginning to fall forward. His degree of suggestibility is measured in inches of sway. The "arm levitation" test is based on a similar principle, and there are other tests in which the subject is given a pendulum to hold and is told that it has a tendency to swing along a given line; or is asked to compare lines of different lengths and then to judge between lines which are actually of the same length; similarly he may be asked to compare the weights of heavier and heavier boxes, the series ending with several of the same weight. Earlier attempts to measure suggestibility, he said, had not shown whether there was any one general trait of suggestibility, or whether the tests in common use really measured this trait; but they suggested that there was personal "prestige" suggestibility on one hand, and impersonal non-prestige suggestibility on the other. In Dr. Eysenck's tests the subjects were 30 men and 30 women, neurotic patients at Mill Hill Emergency Hospital, with an average age slightly below the age of thirty. Results of the tests already enumerated were clear-cut: the body-sway and arm levitation tests and the pendulum tests correlated together; similarly the progressive weights and lines tests correlated; but the two groups of tests showed no correlation at all. He suggests calling the trait measured by the first group of tests primary suggestibility, and that measured by the progressive weights and lines tests secondary suggestibility. The distinction is not identical with prestige and non-prestige suggestibility. That it is a real distinction is supported by other points in the results obtained. Thus, when the distribution of scores in the various tests was plotted, secondary suggestibility showed a normal descending curve, whereas primary suggestibility showed a U-shaped curve. Secondly, secondary suggestibility shows a slight but significant positive correlation with intelligence, indicating a linear relationship between the two; whereas primary suggestibility is related in a curvilinear manner to intelligence, the most intelligent and the least intelligent subjects both showing little suggestibility, while those of average intelligence show most. Primary suggestibility clearly has more significance than secondary suggestibility in psychological work because it has been shown to be related to hypnosis. A further study of primary suggestibility contributed evidence: that (in opposition to Janet's theory) hysterics are no more suggestible than non-hysterical neurotics; that women were less suggestible than men on the tests used; and that results similar to those achieved by Dr. Eysenck in person could be obtained by a gramophone record of his voice giving the suggestion—a situation with much less prestige-value than a personal interview.

PSI PHENOMENA

Dr. THOULESS read a paper presented by himself and Mr. B. P. WIESNER, DSc, on extrasensory perception (psi phenomena), the existence of which he believes to have been established by the researches of Rhine, Soal and others. Starting from the fact that the behaviour of an organism is correlated in some degree with what is happening in other parts of the universe, he pointed out that some part of the universe (perhaps the whole of it) must be projected on the behavioural system of the organism; and that whereas the kind of projection that produces sensory perception might have been the only kind, the existence of psi phenomena suggests that this is not the case. Sensory perception is limited by con-

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tiguity in time and space, but it is possible that projection on the sensory apparatus is superimposed on a more primitive non-sensory system which receives projections which are not spatio-temporally restricted. As evolution progressed it might be supposed that a stage was reached at which the psi function was replaced by sensory perception which because it is more specific in relating the organism to its immediate environment is more biologically useful. It is true, he said, that we cannot imagine any mechanism by means of which psi projection can take place; but this may be because when we try to picture such a mechanism we imagine it as working within a system of spatio-temporal coördinates. The psi phenomena cannot be fitted into current scientific theory for the same reason: science deals exclusively with phenomena connected with the type of continuity found in sensory perception. The assumption, however, that there is some method of projection of events on the organism which is normally suppressed by the sensory perceptual mechanism leads, he thinks, to some definite expectations which could be tested by experiment.

CHILD-ADULT RELATIONSHIPS

Mr. C. A. CLAREMONT described the bond uniting a child and an adult as something real, affecting their conduct. Every child, he said, must have such an adult, and for him the most oppressive dread is to be left alone. The child, by his need for protection, makes a slave of the adult—a fact too often forgotten, he thought, in talking of freedom for the child; and he drew a picture of the adult with a slipper as the slave goaded into momentary rebellion. The relationship is most gravely abnormal when the love-tie is not reciprocal. The child and his adult make a unit, recognised by therapists though not yet by educationists; and the unit has a survival-value for the child, because in his early years he is prepared to take on trust from the adult what he cannot understand, and is protected from dangers by his unquestioning obedience. In later stages of development, of course, he becomes more critical and the adult is required to give his reasons; but the infant does not want to be reasoned with, he wants to be told, and for him "Honour thy father and thy mother" is not so much a commandment as a law of nature. The child-adult relationship also favours transmission of culture. Abnormalities in the relationship are always caused, he said, by a mistaken idea in the adult mind; but the forms it takes vary widely. In schools the relationship with the teacher might be marred because the curriculum may force the teacher to teach what he does not believe to be necessary, or even understand himself; or may compel him to observe some rule which goes against the child's natural bent. He mentioned the case of a nursery school teacher who, having been instructed that the children must play in the afternoon, found she had to give her whole attention to preventing them from working. Montessori and Séguin have blazed the trail, he said, in analysis of the child's difficulties. The teacher in a Montessori school transmits information at appropriate moments, leaves the child to get on with it, and teaches through mutual enthusiasm and consent of the learner. We are building up a concept of the normal child-adult relationship, he thinks. Nearly all our errors come from being intelligent, but not intelligent enough. If we have to choose between what is good for the child's body and what for his spirit, he thought the spirit should get priority: put the spirit first and the body is usually invigorated; put the body first and the spirit drops.

ADOLESCENT LEISURE

Mr. H. E. O. JAMES had persuaded 135 adolescents of both sexes, ranging in age from 12 to 21, to keep a diary of their leisure activities for a week. These activities were classified as reading, radio, clubs, religion, cinema, play, talk, walking, dancing, home duties, study, personal (e.g toilet), meals, travel, and paid work outside school hours. The adolescents were elementary school boys and girls, secondary school boys and girls, and working boys and girls. A characteristic of all groups was the small percentage of time spent on clubs and religion, and the large percentage on the cinema and dancing, walking and talking. The transition from school work was marked by a decrease in play and home duties, and a corresponding increase in gregarious and heterosexual activities (walking, talking, dancing). The change is more abrupt, and earlier, in boys than in girls.

Prof. C. W. VALENTINE, DPhil discussing youth training, said that in a Birmingham investigation it had been found that only 31% of delinquents belonged to clubs: but how far did this indicate that the good types of young people join clubs whereas the less reliable ones don't? A further analysis showed that among boys from good homes regular club membership or the reverse had no bearing on the incidence of delinquency. In younger children the types of delinquency are trivial though the offences are more numerous; the offences in the older age-groups are fewer but more serious, and it is among these groups that psychopathic types with a tendency to recidivism can be recognised. But he believes that the adolescent is approachable. "Every adolescent has a grand passion for something," and can be reached through this quality. Interest at this age fluctuates, and a boy may take up half a dozen hobbies in a year and drop them. This transience of enthusiasm, he said, is characteristic and is not a waste of time. The youth is trying to find out what really appeals to him.

In England Now

A Running Commentary by Peripatetic Correspondents

THE ambulance swayed along the country roads with a pleasant motion. Its glass sides allowed me to see the tops of trees, the roofs of houses and a wedge of sky; but it bore a curious resemblance to a hearse, and lying, an oblong bundle rolled in blankets, full length on a stretcher down the middle, I felt I was helping on the morbid resemblance. The cheery, buxom little nurse beside me was reassuring: I remembered that companions inside the hearse are unusual on that last journey. When the hospital was reached the curious pleasant motion of being stretcher-borne was mine again as they took me to my cubicle. A flustered nurse was stripping the clothes from a high, flat bed with icy sheets. No bottle had warmed it. The blankets were folded double to enable the sides to be tucked in tidily. When this was done I was left with the feeling that I had been inserted into a thick, cold, official envelope, with my head and neck sticking out and resting on a pillow that could have given points to Jacob's stone. The nurse left and I began to examine my surroundings. The walls were a dim wavering green, the windows were white netted and the whole of one side of the cubicle was glass, also covered with net. From the next cubicle a small child in a red bed-jacket fixed me with a solemn stare. The shadowy transparency made me feel like something in an aquarium. However, I had not long to contemplate my surroundings and speculate on the reason for the white gown hanging on the back of the door. My assumption that it was a shroud was never confirmed. Another nurse came in, very much just-so, carrying a tray with thermometer and things, and said she was going to swab my throat. She was most professional. "A little wider, please! Say Ah-h" and the swab-stick rubbed the back of my tongue and was withdrawn. My temperature was taken and young cold blue fingers took my pulse. I timidly hinted that a hot bottle would be pleasant. With a finished soothing manner she said she would bring one and would I like a cup of tea? Surely things were looking up. Presently she returned with a stone hot-water bottle, tied in a grey flannel bag, and inserted it at the foot of the official envelope, remarking, "The heat will come through presently." It never did. The flannel cover acquired a faint, damp warmth and I sadly realised the difference between a tap-filled and a kettle-filled bottle. I hoped the tea would warm me. It came, its passage along the veranda-corridor being delayed by a good deal of talking. It proved to be a single cup on a small tray with a red-stitched mat. As I raised the cup a familiar oily aromatic smell floated out—'Dettol' surely, pleasant as a disinfectant but——. The tea did not actually taste of it. It was very weak, the water had not been boiling, and it had the flavour of slightly greasy dishes and tepid metal. I took one mouthful and gave the rest a miss, sliding down into my envelope again. "Four to six weeks!" I groaned. Then cheered up as I

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thought: "The back of the tongue isn't a very likely place for a dip.-membrane. There's a chance yet. What price three negative swabs!"

* * *

Priorities, essentials first in times of stress, there's nothing new in this, for our bodies abound in them. The use of the right hand rather than the left, step off on the right foot, no, they are not good examples—more acquired than natural. Take the senses then. If a naked man went into a cold room where someone was playing a ukelele and frying sausages, while the walls were hung with Rembrandts, which of his senses would take up the most current? I fancy the skin would almost monopolise the line to the cortex, the 1st cranial would be a bad second, the 8th a neck behind, with the 2nd (and the old masters) also ran. The stomach gives definite priorities. If you swallow an orange pip and a grape pip, the orange will be regurgitated first—at least it is so with mine and I've tried it heaps of times. The rectum and the bladder show a perfect "after you" mechanism. If both are moderately full, the bladder invariably says, "You first, please." If an ill-mannered bladder goes first, quite often a sulky prima donna rectum refuses to budge. When the bladder is very distended, however, the rectum will do an inverted Sir Philip Sidney act, "Your need is greater——" Incidentally I have noticed (other guineapigs please confirm) that after the bladder has made its wonted gentlemanly gesture Nature rewards him by making the kidneys extraordinarily active for about half an hour. Other priorities are the overbearing mastery of thirst, the royal precedence of sex, the dominance of genes, and in that ill-charted ætheric world of mind, the priority of the homely utilitarian over powerful speculative thought like this.

* * *

The wireless was playing Handel's water music and I was letting my mind run. What fun it would be to have after the war a great Water Festival on the Thames.

It's a lovely June day, with the lightest of breezes and just a few little billowy clouds. At a little before noon, two of "our light naval craft" come racing round from Chelsea to the House of Commons jetty, with sirens sounding and clearing all the thousands of little boats to the sides of the river. Then along, at a more stately pace, comes the Royal Procession. In front are two submarines, then two corvettes with masts cut down and funnels on hinges to get under the bridges. They are burning smokeless fuel, of course, for it would never do for the Royal Barge to receive a shower of smuts at every bridge. Then comes the Royal Barge itself, a veritable Ark Royal, flashing in scarlet and gold, with the oars dipping and rising in perfect unison. Then follows a slightly larger, but slightly less magnificent barge, with the Master of the King's Music on the bridge and the London Symphony Orchestra in the hold. Then comes the Red Cross rescue launch, supplied by the RAF, complete with Physicians Extraordinary and Ordinary and Serjeant-Surgeon, all in the robes of the Royal Colleges. Next the Thames pleasure steamers, decorated with crests and flags, the first for the Loyal House of Commons, the next for the no less Loyal House of Lords, the third for the Diplomatic Corps, and the fourth and fifth for all the Lord Mayors and Mayors.

The first climax of the day comes when the Royal Barge draws up at the steps of the Palace at Westminster. Bugles sound, and there are the King and Queen and the two Princesses—the King in the uniform of an Admiral. The Prime Minister helps the Queen aboard and the Royal Party embark. In the party, I can make out the debonair figure of the Keeper of the King's Pictures. He it is who has planned and devised the whole outing, and he has done it well. The Lord Chamberlain brings up the rear with a gigantic luncheon basket, its contents to be consumed on the way to Greenwich. On Westminster Bridge bunting flutters bravely. On the terrace of St. Thomas's, I can make out the white coats of the house officers and the blue and red capes and white aprons and caps of the nurses.

The journey down the Thames is a spectacle surpassing any Lord Mayor's show: for millions of Londoners it will live as the most glorious moment of their lives. Greenwich is a scene of revelry. A magnificent luncheon is served in a vast marquee at 2 PM. Then follows a performance of "A Midsummer Night's Dream" with even the smallest parts filled by the nation's greatest actors and actresses. The interval between tea and the Greenwich banquet is filled in by a royal visit to the new school on the site of a former blitz. And finally the procession reforms for the return—but with a difference. The place of the Royal Barge is taken by a miniature aircraft carrier, its deck converted into a flood-lit dancing floor. And all the docks and warehouses, and great buildings and the Houses of Parliament are covered with a multitude of fairy lights. And for the first time, all His Majesty's loyal citizens have the chance to watch a royal ball. . . .

It was at this point in my pipe-dream that something clicked. Déjà vu! I had been there before. I was back at St. Thomas's, a gauche and pushing resident. We were talking over our next residents' party. "You see that yacht out there, tied up next the converted motor torpedo boat, I believe we could hire it," said Johnny. And he was right. Hire it we did. And to the strains of soft music—was it a radiogram or was it a little dance band, I can't remember—and with the gentle thud of the engines beneath our feet, we passed slowly down to Greenwich. Jane was pale with excitement and radiantly lovely. Sometimes we would stand out a dance, and leave the saloon for the deck. There in the shadow of a life-boat, I had my first kiss—and Jane had hers too. Or was it Alice? I really can't remember.

* * *

There were three of us waiting for our anatomy results, striding up and down like caged tigers, only stopping now and then to stamp and mutter an expletive or throw a cushion at whoever remembered something the others hadn't. How many more nuclei of the trigeminal are there I've forgotten? Why didn't I revise ossification times as I meant to? And wasn't it unfair to ask for a list of intrinsic muscles which someone had said didn't matter? Yes, and what about our lengthy list of probable questions, not one of which appeared in the paper? "Did you say," asks Smith, "that the first milk-teeth to erupt are the lower central incisors? That's the one thing I thought I had taped in the viva, and I said upper incisors. I know you'll both get through and I'll fail." Scuffles ensue as each tries to establish the fact that he will fail and the other two pass. This becomes monotonous, so we sit down and talk hard about the weather, Itma, how to make powdered eggs, and the rotten beer we have been trying to cheer ourselves with. Robinson makes a tentative suggestion about the examiners' forbears, and gets told that any further mention of examiners will incur a fine. After half an hour, by which time each of us is in debt to the tune of some pounds, we declare a moratorium and go for a walk. By the river we reach the realms of higher mathematics, calculating how many medical students, tied end to end by weighted ropes, would choke the river as far as the next weir—and would anyone care anyway? We then espy a "medical" who looks happy, so we descend on him in a frontal and two outflanking movements. Just as he is about to descend gracefully into the bosom of the waters he tells us that the results are coming out at 4.30 instead of 5. We move off at the speed of Jesse Owen towards the lecture-room where generations have quaked and quavered; it must be filled with jelly-like thought-forms. Someone thinks it would pass the time to wash our hands, and we spend 14½ minutes scrubbing them, for results have been postponed till 4.45. We then take our seats and await our fates. A well-known voice says, "The following candidates have been examined and approved," and slowly names are read out. We are all there, and for ten minutes all seems rosy, but by then we have remembered that other exam in two months' time.

* * *

To the psychiatrist, whose daily work consists in handling neurotic patients, a visit to the theatre or the cinema provokes reflections often remote from those intended by the author. The element of drama both on stage and screen is almost invariably a product of the reactions of characters who are either neurotic or psychopathic or both. The productions of Hollywood are nearly always suffused with the sickly tinge of hysteria. The personalities there presented show such

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a blend of emotional immaturity, ruthless egoism covered by a superficial deference to standardised and sentimental ideals, and a preoccupation with conventional values which go no deeper than the merest veneer of civilised life, that one is constantly reminded of the tantrums of one's most tiresome patients. But even the works of more serious authors, with a far more profound grasp of the intricacies of human personality, show the same excessive preoccupation with the hysteric. A visit to *Hedda Gabler*, now playing at the Westminster, reinforces this impression. Three of the five main characters are psychopaths, and two of them, Hedda herself and the unstable genius Eilert Lövborg, are gross hysterics. Why is it that the works of playwrights, far more than that of novelists, are so full of this one psychopathic type? Is not the paranoid fanatic, the rigid and meticulous obsessional, the impulsive aggressive "epileptoid" personality, the hypochondriac, the anxiety neurotic, each in his way just as capable of providing a conflict of situation and character, and of adding a spice of drama to the humdrum run of existence? There is, however, another possibility to be taken into consideration. One is dependent for one's appreciation of a character in a play on the interpretation given by an individual actor. I have heard that many actors, especially the best ones, are hysterics. This is only to be expected, because so much hysterical behaviour consists in play-acting, and because only someone of a hysterical type will devote his best abilities into getting away from his own personality under the skin of another's. It may be that the hysterical quality of so many theatrical characters is not inherent in the part but is added by the actor who plays it.

EUROPEAN ASSOCIATION OF CLINICAL PATHOLOGISTS

IN response to the influentially signed letter in THE LANCET of March 20 (p. 382) there was an attendance of a score of medical men and women drawn from ten countries at the meeting held in the medical school of University College Hospital on April 3 to inaugurate the new association. Austria, Belgium, Czechoslovakia, France, Germany, Great Britain, Hungary, Italy, Poland and Russia were represented. The convener, Dr. F. PICK (Prague) said he had been impressed by the conception of clinical pathology current in this country here and would like to see this method of approach to medicine developed on the Continent. Dr. S. C. DYKE (Wolverhampton), formerly secretary and president of the British Association of Clinical Pathologists, invited to the chair, said that clinical pathology although a special branch of medicine was within itself unspecialised, permeating all branches of medical practice. Meetings of the British Association had formed a happy ground for free interchange of views between practitioners of all kinds. Having been the stock from which the larger idea had sprung he believed the British Association would willingly become a branch of the European Association, whose formation he then moved. Prof. E. J. BIGWOOD (Brussels) seconding the motion spoke of the importance of establishing contacts between clinical medicine and the laboratory. Dr. M. MAIZELS (UCH) hoped that after the war it would be possible to interchange workers between clinical pathological laboratories here and on the Continent. Dr. Dyke read a letter from Dr. A. F. S. SLADDEN (president, BACP) offering the hospitality of all its meetings and gatherings to the members of the European Association. Dr. P. N. PANTON (Lond. Hosp.) spoke of the need for a class of medical practitioners capable of taking charge of hospital laboratories; laboratory workers from the Continent had specialised to a degree which made it difficult for them to do this.

A committee was appointed consisting of B. L. Della Vida (Rome), S. C. Dyke, M. Mandelbaum (Munich), F. Pick, F. Silberstein (Vienna), and J. Ungar (Prague), to draw up rules for the European association, to be submitted to a meeting to be held in London during May. Dr. Pick was appointed secretary and those interested should communicate with him at the Department of Clinical Pathology, General Hospital, Walsall, Staffs.

The 1943 price list of BAYER PRODUCTS Ltd. can now be despatched on receipt of a penny stamp.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE Nurses Bill has passed through all its stages in the House of Commons and has already been read a first time in the House of Lords. The committee stage began with a skirmish led by Mr. Hutchinson of Ilford who wanted the class of nurses now to be registered as "assistant nurses" to be labelled "nursing assistants." The name "assistant nurse" is that suggested by the Athone Committee, but a minority of four state-registered nurses on the committee proposed "registered invalid attendant," a description that Mr. Hutchinson was not prepared to advocate in the House. This skirmish is a sign of the apprehension felt by some nurses that the addition of a large number of assistants to the register will lower the status of the profession. The House evidently felt that this fear was unjustified and Miss Horsbrugh emphasised that the proposed descriptions, "registered nurse" and "assistant nurse," were clear and precise.

A revealing incident occurred in connexion with an amendment moved by Mr. Merser, who has specialist knowledge of nursing questions from the administrative point of view, to make certain that "nursing teachers" shall include men and women. Clause 13, to which this amendment was moved, had as a title "Sister Tutors," an appellation which Mr. Merser thought could only with difficulty be applied to a male nurse. Miss Horsbrugh promptly retreated in face of this attack. The title of the clause was changed to "Qualifications for the teaching of nursing" and an unqualified assurance given of complete equality between men and women teachers. The war has opened many occupations to women, but in this Nurses Bill the rights of man are championed by Act of Parliament, and men and women nurses are put on a common footing. This attitude was emphasised later, in the discussion on clause 15, which gives an opportunity for inclusion on a special list of qualified nurses who omitted to apply at the date specified in the earlier act. Here also men and women are to be treated alike. Miss Horsbrugh stated that men, who have served in the nursing services of the Army, Navy or Air Force will, if they take the requisite qualification, all be on the same footing as women.

This detailed bill, going through its committee stage in a cloud of technical discussion, has improved the position of the nursing profession, and members were eager to pay tributes to our nurses. One spoke of the bill as the stepping-stone to higher things, another as a foundation on which one could expand the profession, a third welcomed it as an advance in their status. Sir Geoffrey Shakespeare drew attention to the need of "time off" for nurses and improvements in food and in living quarters and the Minister of Health wound up the discussion by saying that "it is a happy thing that we should pass this bill in the same week as a national scale of salaries becomes effective for the first time."

It is of especial importance that these changes have been made now in view of the continuing discussions on a comprehensive national medical service. Mr. Brown gave notice, the day after the debate, of the setting up of an interdepartmental committee on dentistry under the presidency of Lord Teviot to consider the "provision for an adequate and satisfactory dental service" for the whole population. But why only one woman on a committee of nineteen? Mrs. Tate, who has won a notable victory for equal compensation for men and women for war injuries, may have something to say about it. What is clear is that more doctors, more dentists, more nurses and more medical auxiliaries will be needed after the war. More extensive social services will mean more attention to health questions and not less. But for the moment the war and after that the budget dominate the political scene.

COMMITTEE ON DENTISTRY

IN the House of Commons on April 8 Mr. ERNEST BROWN, Minister of Health, announced that with the Secretary of State for Scotland he had set up an inter-

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departmental committee on dentistry in connexion with the proposals for a comprehensive health service. The committee will consider and report upon :

(*a*) the progressive stages by which, having regard to the number of practising dentists, provision for an adequate and satisfactory dental service should be made available for the population :

(*b*) the measures to be taken to secure an adequate number of entrants to the dental profession :

(*c*) existing legislation dealing with the practise of dentistry and the government of the dental profession :

(*d*) measures for the encouragement and coördination of research into the causation, prevention and treatment of dental diseases.

Its members are—

Lord Teviot (chairman)
L. C. Attkins, LDS
F. J. Ballard
E. G. Bearn
R. B. Bradlaw, MRCS, LDS
R. J. Brocklehurst, DM
T. H. J. Douglas, LRCPE, LDS
W. Kelsey Fry, MRCS, LDS
Major-General J. P. Helliwell, MRCS, LDS
A. C. W. Hutchinson, DDS
H. T. A. McKeag, BDS
T. Rankin, LDS
Alderman W. L. Raynes
Andrew Shearer
Councillor John Stewart
Dame Gwendoline Trubshaw
R. Weaver, MD, LDS
Bryan Wood, LDS
A. C. T. Woodward

QUESTION TIME

Shortage of Nurses and Midwives

In answer to a question Miss F. HORSBRUGH said that according to the latest available information hospital authorities, both municipal and voluntary, required another 11,341 nurses of all grades to make up present deficiencies. To make up the shortages in institutions 560 midwives were needed, and another 227 for domiciliary work.

Nurses Legislation for Scotland

Mr. I. C. HANNAH asked the Secretary of State for Scotland when it was proposed to introduce a Nurses Bill for Scotland. Mr. T. JOHNSTON replied : The main purpose of such a bill would be to establish a roll of assistant nurses, a proposal which the Alness Committee reported against in 1938, but in view of the altered conditions since that date I am having discussions with the Scottish nursing and other organisations concerned and hope to make a statement shortly.

Miners' Medical Service

Mr. T. J. BROOKS asked the Minister of Fuel and Power if the appointment of doctors for the miners' medical services was yet completed.—Mr. TOM SMITH replied : Appointments have been made to six of the eight regional posts and five of the medical officers have taken up duty. Appointments have also been made to the two headquarters posts, but the deputy chief medical officer will not be assuming duty for a few weeks.

Dermatitis among Miners

Dr. H. B. MORGAN asked the Minister whether, having regard to the increasing incidence of dermatitis in the mining industry, any trial or tests had been made of skin barrier applications ; and whether any exchange of opinion on this medical preventive means had taken place between the medical factory inspectorate of the Ministry of Labour and his department and with what result.—Major G. LLOYD GEORGE replied : The subject of dermatitis among miners and the possibility of using barrier substances have been discussed by my chief medical officer of mines with the factory inspectorate and with the advisory panel on dermatitis, set up by the Minister of Labour and National Service. Generally speaking, barrier substances are useful only in the case of certain processes and this factor governs their use to a great extent among miners. I regard this question, however, as one of great interest, and certain collieries have already been advised of the existence of these substances with a view to their experimental use. The results will be closely watched by the mines medical officers.

Medical Service for Merchant Seamen

Replying to a question, the MINISTER OF HEALTH said that he had seen a memorandum of the Glasgow medical officer of health, approved by the health committee of the corporation, urging the creation of a permanent health and medical service for merchant seamen at the major British ports, to include the setting up of a central representative committee which would unify, or at least coördinate, the minor functions now distributed over several administrations. He and the Secretary of State for Scotland would keep the suggestion in mind in their consideration of the wider question of a comprehensive national health service.

Medical Services in West Africa

Sir FRANCIS FREMANTLE asked the Secretary of State for the Colonies if he would consider the advisability and possibility of establishing a subordinate medical service in West Africa on the lines of that which had for many years done most useful work under the Indian Medical Service.—Colonel O. STANLEY replied : The whole question of medical services in West Africa is now under consideration in the Colonial Office and the provision of African medical auxiliaries of all grades, as well as fully qualified medical officers, has already made considerable progress and will undoubtedly be extensively developed as increased training facilities become available.

Doctors' Staffs

Mr. R. DE LA BERE asked the Minister of Health whether he would confer with the appropriate departments with a view to ensuring that doctors who had lost members of their staffs through the call up and had recently lost further members of their staffs, should be allowed to have those members recalled from the forces in cases where exceptional hardship was involved.—Mr. BROWN replied : In view of the requirements of the forces, I am afraid that I should not be justified in asking for general arrangements to be made for this purpose beyond those applying to other cases. There are already arrangements for considering release in special cases.

Public Health

Compulsory Pasteurisation Now

PROPOSALS for a compromise policy on pasteurisation, to be introduced at once, are made in a memorandum sent to the Government from the People's League of Health with impressive medical backing. It is now a dozen years since a committee of the League reported that the bovine bacillus is responsible for about 6 % of the mortality from tuberculosis, accounting for some 2000 deaths each year in England and Wales—most of them in children. The memorandum points out that consumption of raw milk is also liable to cause undulant fever, scarlet fever and streptococcal throat, food-poisoning, diphtheria, the enteric fevers, and dysentery. So-called clean milk, such as "accredited milk" for which a fairly high standard of cleanliness is required, often contains tubercle bacilli in higher percentage than ungraded milk. Since 40% of dairy cattle in England and Wales are affected by tuberculosis, elimination of this disease from cows can only be a long-term policy. On the other hand, pasteurisation will make milk safe to drink while retaining its nutritive properties.

Opponents of pasteurisation sometimes say that the damage to health done by raw milk is insufficient to justify an upset of existing trade practice. The League replies that raw milk is a greater menace than diphtheria ; "no-one argues that diphtheria immunisation is not worth while because the average number of deaths is only about 2900 a year." Opponents say that pasteurisation can be ineffective ; to which the League replies that this is merely a matter of effective supervision. Opponents say that compulsory pasteurisation will interfere with the milk trade. The League replies that the process has the strong support of the larger milk distributors, and that the objection is now raised on behalf of the producer distributors only :—

Undoubtedly any scheme of compulsory pasteurisation must cause some disturbances of existing practice but these need not be such as to affect livelihood. It becomes simply a matter of the personal interests of a small body of traders against the health and safety of the community. The suggestion that such a scheme must put the producer-distributor out of business is not borne out in practice in places such as Ontario (Canada) where pasteurisation is compulsory. The producer-retailer is at present in a specially favoured position in that he, unlike the ordinary trader, is not penalised if he sells a dangerous food. The very wide difference between the price paid to the producer and that charged to the consumer can be justified only if the distributor who gets the enhanced price sells a *safe* milk distributed under satisfactory conditions.

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To be required to take steps to make his milk safe before he obtains the high price charged to the consumer is *simple equity*.

While the League would favour immediate pasteurisation of all milk-supplies it regards this as impracticable and recommends the following compromises :—

1. That any compulsory pasteurisation order should for the present be limited to all urban areas over a certain population, such as 10,000, and also that during this period distributors who supply tuberculin-tested or milk from attested herds be not obliged to pasteurise their milk. The order not to be made operative until after at least six months to allow time for the required plant to be obtained and adequate supervision arranged.

2. The smaller urban areas and rural areas to have the same powers after application to and approval by the Ministry of Health.

3. That after a suitable period these compulsory pasteurisation requirements be extended to all milk-supplies.

The memorandum is signed by Sir William Savage, MD, and is endorsed by Sir Lancelot Barrington-Ward, FRCS, Prof. J. Basil Buxton, FRCVS, Dr. R. Veitch Clark, Sir Henry Dale, MD, PRS, Prof. Stanley Davidson, FRCP, Lord Dawson of Penn, FRCP, Sir Francis Fremantle, FRCP, MP, Sir Henry Gauvain, FRCS, Sir Ernest Graham-Little, FRCP, MP, Dr. C. O. Hawthorne, Lord Horder, FRCP, Prof. H. D. Kay, Sir Walter Langdon-Brown, FRCP, Sir John Ledingham, MD, FRS, Sir Alexander Macgregor, MD, Prof. Louise McIlroy, FRCOG, Prof. Leonard Parsons, FRCP, Sir Alfred Webb-Johnson, PRCS, Lord Moran of Manton, PRCP, and Miss Olga Nethersole of the League.

Infectious Disease in England and Wales

WEEK ENDED APRIL 3

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2213; whooping-cough, 2078; diphtheria, 798; paratyphoid, 3; typhoid, 15; measles (excluding rubella), 19,568; pneumonia (primary or influenzal), 1494; puerperal pyrexia, 161; cerebrospinal fever, 108; poliomyelitis, 6; polio-encephalitis, 0; encephalitis lethargica, 3; dysentery, 109; ophthalmia neonatorum, 90. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on March 31 was 2454, including scarlet fever, 590; diphtheria, 229; measles, 793; whooping-cough, 293; enteritis, 114; chickenpox, 53; erysipelas, 2; mumps, 27; poliomyelitis, 2; dysentery, 31; cerebrospinal fever, 25; puerperal sepsis, 16; enteric fevers, 7; german measles, 39; encephalitis lethargica, 1.

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 22 (0) from measles, 11 (2) from whooping-cough, 17 (1) from diphtheria, 56 (12) from diarrhœa and enteritis under two years, and 68 (9) from influenza. The figures in parentheses are those for London itself.

Sheffield reported 6 deaths from influenza, no other great town more than 3. There were 6 fatal cases of diarrhœa at Birmingham and 5 at Manchester.

The number of stillbirths notified during the week was 219 (corresponding to a rate of 31 per thousand total births), including 28 in London.

ROYAL SOCIETY OF MEDICINE.—The sections of odontology and the united services will hold a joint meeting on Monday, April 19, at 4.30 PM, when Brigadier Harold Stobie, LDS, Wing-Commander H. I. Clapperton, LDS, Surgeon Commander (D) E. R. Longhurst, LDS, and Squadron-Leader H. M. G. Williams, LDS, will open a discussion on ulcerative gingivo-stomatitis. On April 20, at 5 PM, there will be a general meeting of the fellows of the society. On April 21, at 2.30 PM, at the section of comparative medicine, Sir John Ledingham, FRS, Mr. T. M. Doyle, FRCVS, Mr. J. T. Edwards, D SC, and Mr. Norman Dobson, MRCVS, will be the opening speakers in a discussion on immunity to viruses.

The house of the society will be closed over Easter from Friday, April 23, to Monday, April 26.

Letters to the Editor

RESPONSIBILITY IN HOSPITALS

SIR,—I find it very difficult to understand why medical journals, particularly your own, paint the position in voluntary hospitals in such roseate hues, while painting such a sombre canvas when depicting life in municipal hospitals. Surely an approximation to the truth can be expected, even if propaganda is the motive. The dominant position of voluntary hospitals is being challenged because they are not supplying an effective and comprehensive service. A teaching hospital has its defects, but these pale into insignificance when compared with non-teaching voluntary hospitals. One would suppose, from your leader of April 3, that a junior clinician at a teaching hospital obtained all that he needed in the way of beds and other facilities; but it is true that one of the most famous gynæcologists in London had not more than four beds in his own teaching hospital up to within a few years of his retirement.

Your reference to municipal personnel ("A group of middle-aged men, none too well paid, look forward rather dubiously to their chances of medical superintendency") has no relationship to fact whatever when applied to the Middlesex county council hospitals. These hospitals have a bed capacity of 14,402, which I think is at least equal to that of all the teaching hospitals in London, and herein can be found some of the keenest clinicians within the Metropolitan area. This is proved by the fact that the Middlesex County Medical Society has a larger regular medical attendance than that of any clinical society in London, and the standard of its clinical material and of the papers presented there is, in the opinion of many visitors, at least equal to that obtaining anywhere in England. Perhaps you would care to send a representative along occasionally to verify this statement.

I am sure, too, that the society would welcome any clinicians in the London area who still cling to the delusion that municipal medicine has been dead for many years and that there is no hope of its future revival. I can only typify their attitude, and that expressed by your leading article, as "wishful thinking."

Central Middlesex County Hospital. HORACE JOULES.

SIR,—The vehement tone of your leader betrays more than a reasoned conviction that the voluntary hospital should be the model for all future development. Sober, well-founded belief does not need such extreme terms, unsupported by proven facts. Ignoring the undoubted advances made by municipal hospitals between 1930 and 1939, an attack has been launched, for no apparent reason, upon these institutions and their methods of governance. One had imagined that the rapid growth of an efficient hospital system in the short space of nine years—unparalleled in this country—was well appreciated by the profession as a whole but apparently it is not so. Nevertheless, to general practitioners, to vast numbers of patients and to those whose business it is to visit hospitals up and down the country it is obvious that a great change has been effected in the standards of medical treatment, nursing care, and general amenities. With all modesty it may be claimed that the medical superintendents have played no minor part in this process of uplift.

Those who are intimately acquainted with both types of hospital know that there is good and bad in each. It is therefore the endeavour of every progressive municipal hospital to rid itself of poor-law restrictions, and at the same time to avoid the worst mistakes of the voluntary hospitals. The aim is to produce a better hospital, adequate in size, well-staffed and efficient, avoiding unnecessary publicity. In some areas the better hospital has already been achieved: given another ten years it will be reached by all active local authorities in the country.

The words "hierarchy" and "parallelism" have been ventilated freely during recent weeks. Like most analogies they are incapable of strict application; as your leader admits. Two points are to be noted here. First the senior clinical staff of the modern municipal

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hospital have complete clinical autonomy and are not answerable to the medical superintendent in this respect. Second, there are teaching hospitals in this country where assistant physicians and surgeons have no complete clinical independence at the age of 45. This may not apply to London hospitals; but London is not England—or Scotland.

But why attack the municipal hospitals when they are bearing good fruit? The Government has given no indication of any intention to interfere with the internal administration of the voluntary hospitals, the governors of which will in course of time realise that they have something to learn from the other fellows. If each hospital system develops along its own lines for the next few years, while coöperating fully in each area, the public and the profession will be able to judge which gives the best results. It is obvious that the municipal hospitals have not yet had a fair chance to justify themselves in the eyes of the country, though public opinion is increasingly leaning towards them.

W. A. RAMSAY,
Medical superintendent.

Crumpsall Hospital.

SIR,—In your leading article of April 3 dealing with responsibility in hospitals the organisation of the average municipal institution cuts a poor figure. The marriage of clinician and administrator in one person has no greater chance of success than the old poor-law system of appointing a married couple as master and matron of an institution.

Scotland is making progress along the right lines in the larger general hospitals, where the medical superintendent devotes his whole time to administration. Parallel staffing by senior clinicians is well developed in Edinburgh and Glasgow, and increasing coöperation between the university and the municipal authority secures clnical teaching for undergraduates and elbow-room for research. In quality of teaching and clinical work there is nothing to choose between the voluntary and the municipal hospitals in these cities.

The special hospitals tell a different story. Many of them—mental, fever, tuberculosis—stand today in clinical isolation and suffer greatly in consequence. It is to be hoped that regional grouping of hospitals will bring them into close touch with the general hospital services.

Two remedies may be suggested for the present anomalies of administration: first, to give the clinician authority and freedom in his own field; second, to make medical administration a career by offering a comprehensive course of training and practical experience, and instituting a university diploma in this important subject. A trained medical administrator could readily take responsibility for a group of special hospitals, with the assistance of a lay officer in each unit. The ideal arrangement, however, is to create hospitals which are large enough to require the services of a whole-time administrative officer.

JAMES M. MACKINTOSH.

Dept. of Public Health,
Glasgow University.

SIR,—The following resolution was passed at the last meeting of the medical council of St. Bartholomew's Hospital.

The Medical Council regards it as essential that freedom of expression in medical matters, freedom of speech and freedom of medical practice in hospitals must be preserved in any postwar reconstruction; and that a medical committee should be the advisory body to the governors of an institution on medical matters.

This resolution has been considered by the treasurer and governors of the hospital who have expressed themselves in full agreement therewith.

REGINALD M. VICK
(chairman)
F. C. W. CAPPS
(hon. secretary)

Medical Council,
St. Bartholomew's Hospital.

SLEEP, DREAMS AND TERRORS

SIR,—Your annotation of April 3 on Kleitman's book *Sleep and Wakefulness* induces me to write on this subject in which I have been interested for a number of years. In the *Journal of Mental Science* (1935, 81, 317) I attempted to demonstrate the same type of approach to the understanding of the so-called diencephalic centres of function (centres for sleep, feeling, &c.). It would seem that, in the developing palæencephalon (of the infant) these centres represent the highest reflex arc, the correlation centre synonymous with consciousness at that particular level of development. At these primitive levels the function of these centres is the main interest of the infant and I assumed that, as the centre for this function and the centre for consciousness are the same—i.e., the highest level of functioning neural activity—these functions were consciously controlled, or, as in the case of the thalamus, that these sensations were actually those at that level of consciousness. From this I postulated that "function" was determined ontogenetically and not predetermined phylogenetically, as usually assumed. Further, I attempted to show how disorders of affect in later life could be traced to faulty integration of these lower diencephalic centres with those of the later developing neopallium.

D. N. HARDCASTLE.

Bishops Stortford.

POSTPARTUM HÆMORRHAGE

SIR,—I cannot possibly let your leader in last week's issue on the avoidance of postpartum hæmorrhage pass unchallenged: it perpetuates many of the basic fallacies of obstetrics. You advocate the use of chloroform as an anæsthetic for forceps delivery, although you qualify it as an induction agent only. Surely it has been proved beyond question that chloroform abolishes the uterine contractions. I regard chloroform as the greatest single cause of postpartum hæmorrhage; indeed I assert that the only use of chloroform in obstetrics is to avert threatened rupture of the uterus where a retraction ring has formed. The only possible anæsthetic for a forceps delivery is gas-and-oxygen.

You suggest an injection of pituitary extract so soon as the head has been delivered. This is Edwardian obstetrics. Pituitary extract has two dangers: one, sudden death from pituitary shock, a condition which any obstetrician of experience has seen at least once or twice; and two, that the pituitary extract will act mainly on the retracting segment, thus closing the cervix—and this is, in practice, a too common cause of retained placenta.

Finally, though in this case I cannot be so didactic, I disagree with preoperative blood-transfusion before cæsarean section. I do not know the mechanism, but I do know full well clinically that preoperative transfusion predisposes to bowel paresis, leading even to paralytic ileus. The clinical associatiom here is too frequent to be disregarded.

M. P. REDDINGTON.

Wimpole Street, W.1.

HAY FEVER IN THE TROPICS

SIR,—In his letter in your issue of Sept. 12, 1942 (just received), Dr. Freeman repeats the fallacy that there is not much hay-fever in tropical and subtropical regions. This is by no means the case and indeed it would be surprising if it were. The rapid and luxuriant growth of vegetation in these regions, outside the desert zones such as North Africa, would surely lead one to expect more allergic reactions in predisposed individuals there resident. In this colony hay-fever and allergic rhinitis are exceedingly common, though they have never been reported in the medical statistics. Thus it is that authorities such as Coca, Walzer and Thommen (*Asthma and Hay Fever in Theory and Practice*, London, 1931) state on the authority of the Secretary to the Government that no cases of hay-fever have occurred in the colony, or if they have the number must be so limited that they are never reported.

Bahama grass (*Capriola dactylon*), or as it is often called Bermuda grass, is widely distributed throughout the coastlands of the colony and is a very frequent cause of hay-fever, as in other countries. Barbadoes sour grass (*Andropogon panormitanus pertusis*) is less widely distributed but is scarcely less important than Bahama grass. Rice and sugar-cane pollens must also take a share of the blame, for even though both are self-pollinated and the pollen is rather heavy the strong trade winds distribute large quantities in the immediate neighbourhood of plantations. Cane pollen is responsible for many cases of hay-fever, paroxysmal rhinitis and asthma in consequence of its use as a filling for pillows

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by many of the working class. This by no means exhausts the list of allergic excitants; there are probably many more of less importance still unknown.

In tropical and subtropical countries hay-fever is not seasonal in incidence as grasses pollinate at any time throughout the year after rainfall, but the clinical features are typical, skin tests to the pollens are positive and treatment of early cases by desensitisation satisfactory.

I have seen patients from British Honduras, Trinidad and Barbadoes suffering from hay-fever and do not doubt that the condition in these countries is as common as it is here. Moreover I have seen sufferers from hay-fever who came to this country from the United States and Canada in the course of their employment, having been assured before leaving home that hay-fever was unknown in the tropics but who developed typical attacks shortly after arrival. It should be added that these allergic conditions are not confined to immigrants of European stock but all races are equally affected.

P. A. CLEARKIN,
Georgetown, British Guiana. Government bacteriologist.

SPECIAL HOSPITALS FOR RHEUMATISM

SIR,—My fellow-members of the Heberden Society have done well in pointing out the omission of special centres for the treatment of rheumatism and allied disorders by Medical Planning Research. It is indeed disappointing that though they were advocated, more particularly for rheumatoid disease, in the early 1920's, and in spite of all that has been written and said since, little has been done and the need for them is not yet fully realised by our own profession.

The position is, I feel, however, both brighter and simpler than the letter suggests. It is true that "the standard of practice and research is lamentably low" but we know the reasons (the lack of special hospitals is not the only one), and they are remediable. *Teaching* in the schools on chronic disease and its prevention is very limited and that of physical medicine almost ignored. *Diagnosis* bulks largely in dealing with a group of conditions the limits and ætiology of which are vague, but over-busy doctors have not the time to investigate them. When these things have been put right not only will *practice* improve but interest will be stimulated in this most interesting branch of medicine, for it touches all the others, and there will be no lack of *research* workers of quality.

Obviously special hospitals would depend on this general raising of standards and would themselves raise them still further as the postgraduate schools in this subject and by the facilities they offer for research. The provision of "trained physicians" for them will not be easy for some time; men with good experience of general medicine, a working knowledge of some aspects of orthopædics, and special knowledge of certain methods of physical treatment—a type more common on the Continent than here. Last but not least, behind the demand for special facilities (hospitals, clinics and hostels) there are organised groups, like the Empire Rheumatism Council, Big Industry and the wage earners themselves.

As to the selection of cases, after experience of rheumatism centres in different countries, I do not think it is worth while at present trying to define their work closely, and I agree with Mr. Capener that they should not have to deal with conditions like those he mentions in his letter of April 3. Although surprises are frequent among the cases referred to them, and although they are quite varied enough to keep the physician's diagnostic powers at top bent, they on the whole run along well-worn lines. Diagnosis is, indeed, an important part of the work of special clinics (especially in large centres of population) not merely inside the rheumatic group, but in weeding out non-rheumatic cases from it.

Members of the Heberden Society will agree with every word Mr. Capener writes about the value and, I would add, the pleasure of coöperation between orthopædists and physicians interested in rheumatism. The main aims of physicians, however, are the finding of prime causes, prevention, and early treatment—in other words, they are trying to reduce the need for the orthopædist's care; there will always be plenty of common ground between them.

There is one of the chronic rheumatic group which cries loudly and urgently for special hospitals—namely, rheumatoid disease. It is fair to say that we know enough about this terribly common condition to treat it with as much success as tuberculosis, *if the diagnosis is made early*. As things are this is seldom done; facilities for treatment are usually lacking.

With "planning" and "rehabilitation" so much to the fore, the time has come to fit a plan for dealing with rheumatism into the schemes for our health services. On the material side some of the many hospital and office buildings put up during the war would make good treatment centres.

Droitwich. A. R. NELIGAN.

TEMPERATURE TAKING

SIR,—As Dr. McClean points out in your issue of April 3, the appellation "½ min." or "1 min." to a clinical thermometer is both erroneous and misleading, as the majority of such instruments require 3 minutes to give a correct record of mouth temperature. This fact, while known to many, deserves wider publicity, particularly in the nursing profession. In the practical physiology class at Edinburgh, medical students are invited to find out for themselves how long an ordinary "½ min." thermometer must be kept in the mouth in order to obtain a correct reading of the body temperature. Analysing the results obtained in a class of 180 students last year I find that the average time was 2·6 min. and the shortest recorded time was 1·5 min. The "½ min." thermometer kept in the mouth for half a minute gave readings at least 1° F. too low. I have myself had occasion to check temperatures recorded by nurses, both in hospital and in private, and have found them in most cases ½ to 1° F. too low. I suggest that it would be wise to abolish the "½ min." and "1 min." labelling and to teach both medical students and nurses that 3 minutes is the minimum time. It would also help if the British Standards Institution were to provide a specification for a standard clinical thermometer.

University of Edinburgh. O. A. TROWELL.

SIR,—The only safe attitude to adopt is that taken up by the National Physical Laboratory—i.e., that with any given clinical thermometer the time of registration of the true temperature will vary among different patients and even with the same patient at different times, due to variations in physical condition. When the specification for the 'British Standard Clinical Thermometer' was being considered in 1935 by a committee representing the medical faculties, the NPL, the manufacturers and others it was unanimously agreed that it was misleading to engrave the time of registering on any clinical thermometer; time of registration was accordingly omitted from the specification, only a maximum-sized registering bulb of quicksilver being stipulated.

Unfortunately long-standing trade usage and the fact that clinical thermometers have always been sold to the medical profession and the general public as 2 min., 1 min. or ½ min. patterns stand in the way of any change; and while this system of marking is admittedly misleading it has served to differentiate between slow, medium and rapid registering varieties, and it is difficult to suggest a better alternative, bearing in mind that owing to technical reasons of material and manufacture it is not possible to make all clinical thermometers to a single time standard.

Fortunately, with any patient in a state of fever any clinical thermometer made to proper standard will register quickly and within the time stated on it; but with subnormal temperatures the time of registration varies considerably and may well exceed even the three minutes regarded by Dr. McClean as sufficient. In any case the time of registration will be governed by the number of degrees through which the mercury has to be raised, or in other words the difference in temperature between the registering bulb and the mouth in which it is placed. Naturally this will vary between summer and winter, and depend upon whether the thermometer has been taken from the doctor's warm pocket or from a drawer in a cold room.

G. H. ZEAL LTD.
London, S.W.19. Manufacturers of Thermometers.

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PREFRONTAL LEUCOTOMY

SIR,—In answer to Dr. Winnicott I should like to make my own position with regard to prefrontal leucotomy perfectly clear, and I think this can best be achieved by giving you one of the terminal paragraphs in a paper which I read before the Royal Medico-Psychological Association a few weeks ago. Having described my operative technique and the physical results following operation I stated: "I would suggest, therefore, that this operation, valuable as it may be in individual cases, should be regarded still as an experimental procedure, justifiable only when all other available methods of treatment have failed and when experienced psychiatric opinion is convinced that no hope of spontaneous cure remains."

Harley Street, London, W.1. WYLIE MCKISSOCK.

PREVENTION OF VENEREAL DISEASE

SIR,—I subscribe fully to Professor Ryle's long-term policy for the prevention of venereal disease. But can we not have a short-term policy too? It is a striking thought that if during the next six months every man in the British Isles wore a condom for extramarital intercourse, syphilis as a communicable disease would disappear entirely.

Edinburgh. SHAKESPEAR COOKE.

Obituary

ERNEST WILLIAM GURNEY MASTERMAN

MD DURH, FRCS, DPH

Dr. Masterman, who died in Jerusalem on March 29, will be remembered for his work as medical missionary in Palestine and as medical superintendent of St. Giles Hospital in Camberwell. He was one of four brothers brought up at Rotherfield Hall, Sussex, each of whom made his mark in public life: J. H. B. Masterman, DD, as bishop and historian; A. T. Masterman, FRS, as fisheries expert at the Board of Agriculture; C. F. G. Masterman, PC, as belletrist and Liberal statesman. Dr. Masterman was educated at Clifton College and Monkton Combe School, Bath. He began medicine in 1884 at Edinburgh where he was drawn to missionary work. Family difficulties interrupted his studies till 1887 when he was able to continue his course at Bart's where he held Brackenbury, Skynner and Lawrence scholarships. He qualified in 1891 and took his surgical fellowship the following year. After house-appointments at Bart's, and the Belgrave Hospital for Children, and a studentship in pathology at St. John's College, Cambridge, he went to Jerusalem as assistant to Dr. d'Erf Wheeler at the English Mission Hospital, and later succeeded him as superintendent. He described the scope and some of the difficulties of medical work in Jerusalem in our columns (*Lancet*, 1918, i, 305). When the last war broke out he returned to this country and in 1916 was appointed to St. Giles Hospital. O. W. R. writes: "The Camberwell board of guardians were among the progressive members of the poor-law authorities, and in Dr. Masterman they found an enthusiastic and capable medical officer. His professional bias was surgical, and long before the passing of the boards of guardians in 1930 the surgical reputation of St. Giles was firmly established in South-east London. But he had a balanced outlook and the other departments of the hospital were in turn brought up to date. The maternity unit with its growing antenatal and postnatal clinics was his special pride and when he retired a comprehensive outpatient department was rapidly materialising under the London County Council. Many nurses serving in all parts of the world will long remember Masterman's lectures and practical advice. His interest in their social and religious life was characteristic and his Sunday evening family service was a regular institution in the nurses' home. Masterman also supervised the medical work in the guardians' institution at Gordon Road, and their many 'scattered homes' for children. His patients, working-class or local business magnates, regarded him as their medical friend and adviser, and he was. The local doctors found him a ready and able adviser, to whom they could look for help in any difficult or tricky case. To his own medical officers he was a tolerant and fatherly chief."

When he retired in 1933 Masterman's interests inevitably drew him back to Palestine, for he was an Arabic scholar, learned in archæology and for a long time secretary to the Palestine Exploration Fund. For several years he held a roving commission for the Church Missionary Society, freeing hospital superintendents at es Salt, Gaza and Hebron for well-earned leave. He was appointed medical superintendent of the former German Deaconesses Hospital after it was taken over at the beginning of this war, and when it became the 60th General Hospital he remained in charge. Its evacuation to India left him at last without a fixed job, but he had lately become medical adviser for the Near East to the CMS. Ill health, however, intervened, and he spent three months in hospital after an operation. Last July, happily, he was well enough to visit the Lebanon Hospital for mental diseases at Asfuriyeh, of which he was for long chairman.

Dr. Masterman married Johanna Zeller, daughter of the Swiss Bishop of Jerusalem, and of their large family Dr. E. B. Z. Masterman is serving with the RAMC in West Africa and Dr. Meta Masterman is RMO at Selly Oak Hospital, Birmingham.

Notes and News

A LESSON IN REGIONALISATION

INVITED to address the annual meeting of one of the most conspicuous examples in our time of the success of the voluntary principle, Mr. E. Rock Carling set himself the ungracious task of explaining how freedom should be free to forgo fractions of freedom when it is necessary for the public good. He was speaking last week at the Christie Hospital and Holt Radium Institute in Manchester (and remarked that the word "radium" in the title was almost an anachronism, for the whole field of irradiation was now being covered). It was still possible, he said, for any doctor, with or without training, to hire or purchase radium and radon for the treatment of cancer. He was blaming no-one, for he had been an offender himself. But the narrow margin of safety in dosage had led in the last few years to a realisation of the refinement of technique necessary for its use, and while it seemed a pity to stand in the way of people getting treatment conveniently near their homes, the use of irradiation in any form must now be discouraged except under the guidance of a team of experts and with adequate safeguards for personnel. There was another fraction of freedom to be surrendered, this time by the Institute itself. In the past it had been a noble gesture to build a hospital, a theatre, or a department, and voluntary effort had done valiantly for the acute sick. But in provision for the chronic sick, voluntary effort had been hopelessly inadequate; it was strange that the benevolence which long ago founded almshouses had apparently lost sight of the chronically suffering and the infirm. Hospital planning must henceforth embrace all needs and cover an extensive area, for some purposes the whole country. Buildings for radiotherapy should not be sited far from the teaching hospitals and universities, for the radiotherapy of cancer must develop in close association with other departments of medicine and surgery and with the faculties of science. Manchester, he was glad to see, was doing its radiation work in a county hospital, and if that could be done for radiation it could be done for every other medical purpose. The service traversed the borders of 20 or more special authorities and the staff carried expert diagnostic skill to a score of hospitals. Little matter, he said, whether the clinic was in a municipal or a voluntary hospital, given the freedoms that are fundamental. And the freedoms would be forthcoming.

Medical Honour

The DSC has been awarded to Prob./T/Surgeon Lieutenant J. A. Oddie, MRCS, RNVR, for "bravery and skill in the hazardous operations in which the allied forces were landed in North Africa."

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University of Sheffield

At recent examinations the following were successful:

MD.—T. R. Forsythe.

FINAL EXAMINATION FOR MB, ChB

Parts II and III.—Ian Anderson, H. J. Dooley, Marie France, G. L. Hermitte, P. E. H. Howarth, R. A. McFadden, D. S. Mall, R. E. Peasegood, Ethel W. W. Sharrard, H. J. Whiteley, Joel Wilbush, and Elena Zadik.

University of Edinburgh

At a graduation on April 5 the following degrees were conferred:

MD—*G. R. Lunn.

PhD—M. Y. Ansari.

MB, ChB—Hamdi Alá ud-din, *D. St. J. Bowie, I. A. Brooks, George Davidson, K. G. S. Davidson, R. A. M. Hamerton, T. A. Hope, H. J. Mackay, A. H. MacKinnon, I. G. Maclean, J. M. G. Parker, R. W. Pettigrew, T. M. Pole, Joseph Rifkind, A. E. Smith, and Margaret M. Timpany.

MD of the Polish School of Medicine—J. W. Czekalowski.

MB, ChB of the Polish School of Medicine—Ludwik Gelber, E. J. Olewicz, Hanna Poznanska, Henryk Urich, and Pawel Weitzen.

* In absentia.

Royal College of Surgeons of England

At a meeting of the council of the college on April 8, with Sir Alfred Webb-Johnson the president, in the chair, the Jacksonian prize for 1942 was awarded to Mr. E. W. Riches for his essay on paralysis of the bladder following spinal injury and a Hunterian professorship for 1943 was offered to him. The subject for the Jacksonian prize for 1944 will be the causation and treatment of delayed union of fractures of the long bones. The John Hunter medal and triennial prize was awarded to Captain Graham Weddell, RAMC, for his research work on the ultimate distribution of the sensory peripheral nerves.

Dr. H. I. Shaheen Bey of the Kasr-el-Aini Hospital, Cairo, and Surgeon Captain W. J. Colborne, surgical specialist RN, were elected fellows under the charter which permits the council to elect annually to the fellowship, without examination, two members of twenty years' standing.

Mr. A. C. Perry was elected a member of the court of examiners for a year and Mr. Eardley Holland was re-elected representative of the college on the Central Midwives Board.

Diplomas in child health were granted jointly with the Royal College of Physicians to the following:

Kurt Aterman, Iris M. Cullum, Mary R. Davies, Marguerite P. Elman, Martha Klein-Dynski, Margaret E. Matthews, B. U. Meyer, Asher Pearlman, Pushpawati M. Shankland, Nuala E. Sheehan, Marjorie Small, Ruth M. Stevenson, R. M. Todd, I. G. Wickes, and Mair Williams.

Royal Institute of Public Health and Hygiene

The institute has awarded the Harben gold medal to Sir Henry Dale, PRS; Dr. James Fenton, MOH of Kensington, receives the Smith award.

Medical Casualty

Surgeon Lieutenant Ivan Jacklin, MB Lond, RNVR, has been posted as missing on active service during March.

Doctor's Bravery

In the *Times* of April 7 an Associated Press correspondent describes how Surgeon Lieutenant P. R. C. Evans, MB Lond, with both legs broken, attended more than 50 injured seamen for over 12 hours when the Canadian corvette *Weyburn* was sunk.

Evans was the medical officer of a British destroyer which picked up most of the *Weyburn's* survivors when she sank on her way back from the Mediterranean. He was standing on the destroyer's deck, helping survivors from the water and attending the wounded, when the corvette went under and his legs were broken below the knee, with those of more than half a dozen others, by a second underwater explosion which followed her disappearance. The doctor was dazed for a few minutes. Then he refused efforts to carry him to a cot in the destroyer's wardroom, and was carried by three ratings round the destroyer's decks while he attended the slightly wounded and injured there. Then he ordered them to take him to the wardroom, which was filled with men injured by the second explosion. By each cot the ratings placed him in a sitting position on the floor. He examined the patients and gave orders for treatment to the sick bay attendant. In spite of the pain he suffered every time his legs were moved, Evans insisted on carrying on without rest. Only when every examination had been made did he allow himself to be placed in a chair, with his legs stretched out straight in front of him, for what small measure of comfort was possible. He still refused to stop work, and sat in the chair for 12 hours until the destroyer reached Gibraltar, directing the treatment of several men seriously wounded or burned. Doctors and attendants from a shore hospital came on board, and as the procession of stretchers began to move off the ship Evans called for another stretcher for himself.

An Association of Physical Medicine

It is proposed to form an association of physical medicine. With this object in view a meeting will be held at the Medical Society of London, 11, Chandos Street, London, W.1, at 2.30 PM on Wednesday, May 5, which all members of the profession who are interested are invited to attend.

Medico-Legal Society

A meeting of this society will be held at 26, Portland Place, London, W.1, on April 21, at 5.30 PM, when Dr. J. C. M. Matheson and Dr. Denis Hill will read a paper on electro-encephalography in medico-legal problems.

University of London

The title of reader in medicine in the university has been conferred on Dr. Clifford Wilson in respect of the post held by him at the London Hospital medical college.

NURSES' REGISTER: *Corrigendum.*—We were inaccurate in saying (*Lancet*, April 3, p. 439) that the Nurses Bill "contains a clause to enable trained nurses to register now who could have registered under the Nurses Registration Act, 1919, but who failed to do so." The bill merely provides that a list of these nurses may be made and kept by the General Nursing Council, and that those affected shall be entitled to call themselves "nurse."

Messrs. JOHN WYETH and Brother are moving their offices to Clifton House, Euston Road, London, N.W.1, on May 3.

Appointments

GRAY, W. N., MB GLASG.: medical referee for the sheriff-court district of Dornoch (Sheriffdom of Ross, Cromarty and Sutherland).

LANGLEY, G. F., CH M BRIST., FRCS: medical referee for county-court districts of Ipswich, Woodbridge and Felixstowe (circuit 33).

MAIN, W. R., MB EDIN.: examining factory surgeon for Buckingham, Bucks.

Births, Marriages and Deaths

BIRTHS

BATEMAN.—On April 3, at Gerrards Cross, the wife of Squadron-Leader Geoffrey Bateman, FRCS, RAFVR, of Eton Avenue, N.W.3—a son.

CAMPBELL.—On April 5, at Margaretting, the wife of Captain J. W. Campbell, RAMC—a son.

FRASER.—On April 6, at Bermuda, the wife of Surgeon Lieut.-Commander Peter Fraser—a daughter.

FRENCH.—On April 3, in India, the wife of Lieut.-Colonel John French, IMS—a son.

GRACE.—On April 4, at Beckenham, the wife of Major Michael Grace, RAMC—a son.

HAMILTON.—On April 4, at Beckenham, the wife of Dr. John Hamilton—a son.

HARROWES.—On April 6, in Edinburgh, the wife of Dr. W. M. Harrowes—a son.

LEE-WOOLF.—On April 2, at Banbury, the wife of Dr. Basil Lee-Woolf—a daughter.

SCOTT.—On April 5, at Cardiff, the wife of Dr. W. Clifford M. Scott—a son.

VARTAN.—On March 25, the wife of Mr. Keith Vartan, FRCS—a son.

MARRIAGES

ATKINSON—WEBB.—On April 7, at Painswick, Glos., Esmond Allan Atkinson, MB, to Desirée Elizabeth Webb.

FAWSSETT—HUBBARD.—On April 3, in Middle East, Edward Leonard Fawssett, major RAMC, to Dorothy Grace Hubbard.

MCCABE—HALL.—On April 3, at Weybridge, Harold Francis McCabe, LRCPI, to Joan Hall.

DEATHS

LYNCH.—On April 5, at Swanscombe, Kent, Michael Francis Benet Lynch, MB LOND., aged 39 years.

STEADMAN.—On April 11, Frank St. Jermain Steadman, MRCS, LDS, DPH.

STRATON.—In April, by enemy action, Arthur Arbuthnot Straton, MD LOND., FRCSE, of Newport, Isle of Wight.

SYDENHAM.—On April 5, at Walsall, Frederick William Sydenham, MD EDIN., FRCSE, of Harborne Road, Edgbaston, Birmingham.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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FORMATION OF RED BLOOD CORPUSCLES

FREDERIC DURAN-JORDA, M D BARCELONA
DIRECTOR OF PATHOLOGY DEPARTMENT AT ANCOATS HOSPITAL; LATE CHIEF OF THE BLOOD TRANSFUSION SERVICE OF THE SPANISH REPUBLICAN ARMY

FOR several years I have had a strong conviction that the red blood corpuscle is not a product of cellular evolution but is a product of cellular secretion. I have come to this conclusion because to me the commonly accepted explanation of its origin is unconvincing.

For instance, if we accept the development of the red blood corpuscle as being from a hæmatocytoblast, which becomes by stages an erythroblast and normoblast, and which then finally expels its nucleus, it is a strange fact that no investigation in any part of the body has revealed the normoblast expelling the free nucleus. On the other hand, if we accept the theory that the nucleus is dissolved in the protoplasm, karyolysis of the nucleus has never been seen in any portion of the body. It is very hard to agree with the idea that a cell bursts its membrane and expels the nucleus, which is the directive part of the cell, the membrane afterwards closing and the cell becoming a new body.

The different forms and shapes of the red blood corpuscles and their different sizes are puzzling and unexplained facts when one considers that all the cells come from one and the same ancestor. Another factor which has never been fully understood is the easy way in which blood is replaced after blood donation and severe anæmia, and this recovery is particularly striking when it is compared with the time taken to remake the same weight of any other tissue. There is also the phenomenon of hæmolysis in vivo and its different ætiologies, and in vitro. Still another important point is that although it is accepted that the hæmatocytoblast, normoblast and megaloblast have developed from connective tissue, no case of a sarcoma of any of these cells has ever been reported.

If we consider the evolution theory in animals we find that the scale of blood development follows an order which appears absolutely illogical. In the insects and invertebrata the blood pigment is in solution in the circulating fluid and has no cells acting as pigment carriers. Going up in the animal scale to the fishes and birds, we find that these creatures have a nucleated red blood corpuscle which has the characteristics of a cell. Generally speaking, the birds and fishes live under very limited conditions of oxygen-supply as compared with those on the surface of the earth, but their nucleated red blood corpuscles function perfectly. It is interesting, then, to study the mammals which have a non-nucleated red blood corpuscle—a surprising fact seeing that these animals live under much better conditions of oxygen-supply than the fishes and birds. Yet one mammalian red blood corpuscle is thought to be produced by the evolution of one cell in about four stages, a process which appears unnecessary in the light of the aforementioned facts.

As a part of her physiological make-up (e.g. in menstruation and parturition) the female mammal recurrently loses blood; it is difficult to understand why nature should dispose of this blood after the supposedly complicated process undergone in its production. Another significant fact is the appearance of lactation. Before the birth, nature uses the blood of the mother to nourish the fœtus. When this blood-food ceases at birth, lactation begins, and nature solves the vital problem of feeding the undeveloped, newborn child with a fluid which is almost identical with the blood. The two fluids, blood and milk, have the following composition:

BLOOD	MILK
Blood corpuscles, without nucleus.	Fat corpuscles, without nucleus.
Leucocytes, in order of percentage:	Leucocytes, in order of percentage:
Polymorphs.	Mononuclears.
Mononuclears.	Polymorphs.

Blood and milk clot in the presence of ferments thrombokinase and rennet respectively and in the presence of calcium, and in both cases the clot shrinks and expels a serum. Keeping in mind these facts, and information gained from histological examinations, from some pathological processes and from the study of a long series of bone-marrow investigations, I became convinced that the red blood corpuscle is not a cell.

With this idea in mind I began to study embryology. Embryo slides proved to me that my conviction is correct and the problem was much simpler than I had imagined; for by examining a 2·5 mm. embryo under oil immersion I found it easy to see that the nucleated red blood corpuscle is not a cell, as has been accepted, but a complex within a cell. The original cell, which is here termed the "stem cell," contains a large amount of protoplasm (fig. 1). In this protoplasm there is an

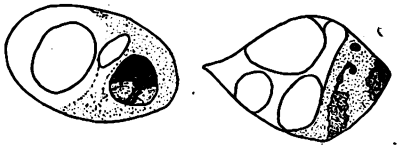
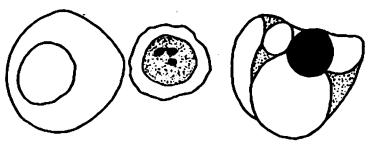


Fig. 1—Semischematic drawings of two blood-forming cells from a 2·5 mm. human embryo.

eccentric nucleus made up in a "cart-wheel" formation. Around the nucleus and along the sides of the membrane a small halo of lighter stained protoplasm can be easily distinguished. By focusing carefully it is possible to see inside the protoplasm a few spheroidal bodies, some of which are the same size as an ordinary red blood corpuscle. By investigating other fields it can be seen that the stem cell bursts into two parts; one part consisting of some of the spheroidal bodies which have become free, the other part being the "cart-wheel" nucleus surrounded by a small quantity of protoplasm (fig. 2).

When I found the stem cell I immediately began to understand the function of plasma cells all over the body because of their similarity to the immature stem cell. I knew already that some plasma cells contain similar spheroidal bodies, but as I then had no evidence of blood secretion in the embryo I could not put the facts together.

This stem cell, which secretes the red blood corpuscle, has been seen by many observers, but the process has



2 3

Fig. 2—A red blood corpuscle extruded from the stem cell (which retains the nucleus); drawn from a 2·5 mm. human embryo.

Fig. 3—Red blood-cell from the liver sinuses of a fœtus.

been wrongly described as phagocytosis of the red blood corpuscle. Cells of this type are found without difficulty all over the body, and I have seen them in the spleen, in the liver blood-sinuses of a fœtus, in the thymus, thyroid, and interstitial mucosa, in multiple pathological processes in which the plasma cell is evident, and also in the lymph glands.

I concluded that these cells should also be present in the bone-marrow; but in a large number of investigations of the bone-marrow I was unable to find them until I realised that the failure was possibly due to the deficiencies in the method and technique used for the study of the bone-marrow. There were three reasons for this failure:—

1. In taking the bone-marrow, suction is made with the syringe which produces a negative pressure in the bone-marrow; as a logical consequence any mature stem cell present will burst.

2. By the method of spreading a drop of marrow blood over a slide and drying, the spherical red blood corpuscles are flattened, and any remaining stem cells are destroyed.

3. It was also impossible to find the stem cell by the method used for a white cell count of the bone-marrow because for this count the diluting fluid used contains acetic acid which destroys all the red blood corpuscles.

I therefore changed the method as follows:—

I prepared a diluting and fixing fluid of saline solution with 10% formalin, and added methylene-blue to some portions and eosin to others. I put 5 c.cm. of each solution in a different waxed test-tube, with 1 drop of 4% sodium citrate and 0·1 c.cm. of blood obtained from the bone-marrow.

I punctured the sternum with a paraffin-coated needle and collected in a capillary pipette 0·1 c.cm. of the blood which sometimes appears spontaneously after the first marrow blood

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has been sucked off. The fluid was first warmed at 37° C., as a further precaution to preserve the stem cells, and the examination was done on a wet chamber.

I examined a large number of fields with a high magnification, and by this method I found the cell in the bone-marrow. It appears in two forms—unbroken and broken. The unbroken cell is shaped like a pear. In the head of the pear there is granulated protoplasm enclosing a nucleus, which if stained with methylene-blue shows chromatin in a cart-wheel formation. In the protoplasm some spheroids of hæmoglobin can be seen. If one observes the process of fragmentation or finds a recently broken cell three parts become clear:—

1. The spheroidal bodies, which contain hæmoglobin and are the accepted red blood corpuscles.
2. The small fragments of protoplasm from other parts of the cell which have a granulated appearance, some of which are floating around free and others becoming attached to the other bodies.
3. The nucleus of the broken cell with its cart-wheel formation, surrounded by a small halo of protoplasm.

When this became clear I immediately realised that from the three components of the stem cell come:—

1. The red blood corpuscles.
2. Protoplasmic granules which are the platelets.

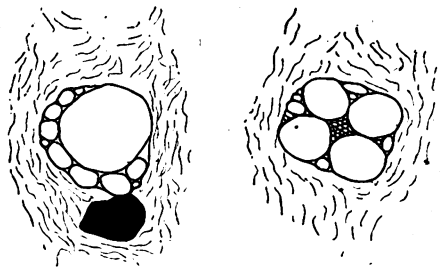

Fig. 4—(a) A plasma cell from subcutaneous exudation. (b) The same cell from a different focus.

3. The cart-wheel nucleus which is the cell called the normoblast and erythroblast, and which, in my opinion, eventually becomes the lymphocyte.

The formation of the red blood corpuscle as a secretion logically explains their different sizes and shapes, and the different inclusions found in them, in different diseases. The formation of the platelets from the protoplasmic remnants of the stem cells gives a logical explanation of their composition and numbers in the peripheral blood because the theory of platelet formation from the megakaryocyte is mathematically untenable. The formation which results from the remaining cart-wheel nucleus of the stem cell clears up the mystery which has surrounded the lymphocyte; for the lymphocyte in the bone-marrow has characteristics which are very difficult to classify as definitely belonging to either the normoblast or the lymphocyte group.

Moreover, the study of a large number of the lymphocyte in tissues all over the body suggests that this cell has another function besides merely staying in hiding. I think now, after studying lymph-glands, that the lymphocyte may have a cycle of evolution in which it develops as a plasma cell, afterwards becoming a stem cell which subsequently bursts and throws out its products, and finally becomes a lymphocyte again. This cycle I have called the "unicellular gland" cycle; it seems a logical idea when one compares the secretion of the blood-corpuscle-forming cell with the secretion of the other gland cells in the body. The gland secretes a product and the product is expelled from the cell, the cell going back into repose again and accumulating fresh products and making new secretion; but no-one has ever determined in any glandular cell the number of times this cycle takes place in the same cell before it dies from exhaustion. The appearance of some hypertrophic lymph-glands suggests to me that only a part of the lymph-gland works while the other part remains at rest (fig. 5). I am also convinced that blood formation is not possible without the help of another cell—the eosinophil—on a symbiotic basis. I am not prepared to discuss this fully at present, however.

As a result of the above investigations I have arrived at the following conclusions:—

1. The red blood corpuscle is formed from the plasma cell. As the plasma cell occurs all over the body one must assume that the red blood corpuscle can be formed all over the body and not only in the bone-marrow as is currently supposed.

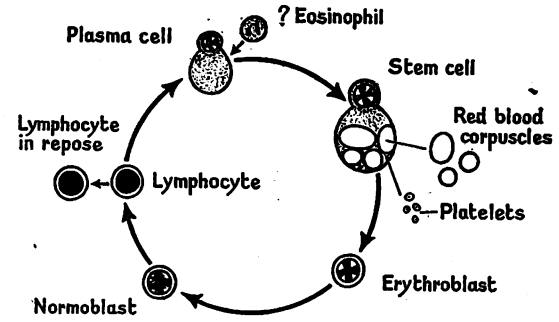

Fig. 5—Diagram of unicellular gland cycle.

2. The red blood corpuscle is a secretion of the plasma cell and is formed when the plasma cell disintegrates.
3. When the plasma cell disintegrates the nucleus is extruded with a small halo of protoplasm and this exists as an independent cell, corresponding to what is currently known as the normoblast.
4. The red blood corpuscle is a simple droplet of colloidal nature and is in some respects similar to the fat globules in the milk.
5. The accepted lymphocyte is really a stage in the development of the normoblast.
6. The platelets are really protoplasmic remnants of the original plasma cell which has broken up.

I suggest that this new conception of the evolution of blood formation will help to explain some phenomena which have puzzled hæmatologists for many years. Thus no-one has ever made a clear differentiation between the myeloma cells and the plasma cells, and it is my opinion that the plasma cell forms the stem cell secreting the red blood corpuscles and that the myeloma is a malignant degeneration of it. This malignant degeneration occurs in the original stem cell and not in any of the cells subsequently developed—and this explains the absence of malignant degeneration in the normoblast, megaloblast, erythroblast and red blood corpuscle.

Lymphatic leukæmia seems to be a disease produced when the nuclear product of blood formation is unable to complete the cycle of evolution. The local infiltration of lymphocytes as seen in chronic diseases is suggestive of local production and destruction of red blood corpuscles. Gaucher's disease and Niemann-Pick disease appear to be metabolic diseases of the stem cell which is incapable of carrying out its normal function. Vascular tumours such as angiomas, angioblastomas, angiosarcomas and Kaposi's disease give an example of local blood formation; it is well known and accepted that these tumours have no connexion with the general circulation.

The red blood corpuscle appears to have another unexplained function in addition to being the pigment carrier; this is suggested by the local red blood corpuscle production under some conditions.

We must consider that the red blood corpuscle obeys the general laws of colloidal suspension.[1] It has been found that a corpuscle of 7·5 μ has the optimum chance of survival; so that in blood diseases where the red blood corpuscles are smaller or larger than this, they are liable to a rapid destruction. As a consequence, all currently accepted theories concerning agglutination of red blood corpuscles should be revised on the basis of the laws of colloidal chemistry.

I wish to thank Prof. F. Wood-Jones for his help and the loan of slides of embryos; Dr. T. E. Barlow for the drawings; and my secretary, Miss Cadwallader.

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VITAMIN-C SATURATION TEST

STANDARDISATION MEASUREMENTS AT GRADED LEVELS OF INTAKE

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EARLIER papers have defined the standards used in assessing the results of tests for vitamin-C status by the saturation method. Loading doses of vitamin C are given daily under specified conditions and the number of days is counted until the plateau of excretion, marking the attainment of saturation, is approached. The criteria accepted were based on the following observations. With a history of a dietary intake of about 30 mg. per day of ascorbic acid (LoN standard of requirement), or an amount only slightly above it, the specified response is seen by the second day of test-dosing; with lower intakes the number of days before the response increases progressively in proportion, until with cases of developed scurvy about 7–10 days are needed before saturation is attained (Harris 1942a). Preliminary data have already been published, in the paper just cited and elsewhere, in support of these criteria, various levels of past intake having been correlated with the corresponding graded responses to test doses. More extensive figures are now presented. Concordant results having been obtained in trials carried out at various periods during the past few years, it is felt that the standards proposed can be regarded as established on a sound quantitative basis.

Technique of test-dosing.—In the experiments to be described, the simplified procedure of Harris and Abbasy (1937) was employed as before; it necessitates the collection of a single sample only of urine each day. The test dose of ascorbic acid, 700 mg. per 10 stone of body-weight (approx. 11 mg. per kilo), is given at 10.30 in the morning, the bladder emptied at 2 PM and a 2½-hour specimen of urine taken at 4.15—i.e., around the fourth and fifth hours after test-dosing when the daily response is at its peak. The first day on which the excretion reaches 50 mg. or more per 10 stone in the period of 2½ hours is taken as marking the approach to saturation (see Harris 1940, 1942a). (In the event of the experimental conditions being varied, as for example with a longer period of collection of urine each day, it is necessary to determine afresh by separate observation what alternative figure, in place of the 50 mg., is to be taken as representing the lower limit for the plateau of saturation.)

Plan of experiment.—The principal human material tested was the group of about 3 dozen boys in the residential home referred to in a paper just published (Harris and Olliver 1943). This paper may also be consulted for a description of the method used for determining daily the amount of vitamin C in the institutional diet. Saturation tests were done on groups of boys maintained on this diet alone or after periods on various graded supplements of vitamin C, given as orange juice, synthetic ascorbic acid ('Redoxon') or blackcurrant purée. In the earlier trials the entire group of boys were tested (*a*) on a prewar winter diet (spring 1938), (*b*) on the same plus an orange daily (spring 1939), and (*c*) on an unsupplemented wartime winter diet (spring 1941). (At the same time incidental comparisons were instituted with working-class boys on poorer but less accurately known intakes, and on research workers, medical students and women undergraduates.) This earlier work gave approximate criteria, and in two subsequent surveys a further refinement of the data has been aimed at. In the first of these two the boys were divided into three equal groups, the first group receiving the basal diet (summer season) alone, the second the same diet plus 15 mg. of ascorbic acid daily and the third the diet plus 25 mg. of ascorbic acid. After several months on these regimens saturation tests were done at the end of the summer of 1941. In the latest survey the boys were again divided into three groups, the first having the diet alone (winter season), the second the diet plus 15 mg. daily of ascorbic acid in the form of blackcurrant purée and the third 25 mg. of ascorbic acid also as blackcurrant purée, the tests being done in the spring of 1942.* The boys in the control groups received, in place of the added ascorbic acid or blackcurrant purée, a placebo consisting of glucose tablets or artificial lemon-flavoured drink respectively. For details of the technique of chemical analysis of the urine and the method of interpreting the calculations, reference may be made to an earlier paper (Harris 1942a). This also gives some account of the results of the earlier experiments (spring 1938–autumn 1941). It will be sufficient if we supply here the full numerical values only for the final experiment, just referred to (spring 1942), and give summarised data for the earlier ones.

Amount of vitamin C in basal diet.—During the 4 months preceding the saturation tests of April, 1942, the daily intake of ascorbic acid in the institutional diet had varied from about 20 to 25 mg. per day (see values for monthly averages, Harris and Olliver 1943). Hence the total intakes per group were as follows: unsupplemented group, 20–25 mg.; group receiving additional 15 mg., 35–40 mg.; group receiving additional 25 mg., 45–50 mg. Similarly in the 2–3 months before the tests in the autumn of 1941 the intake in the basal diet was around 40–50 mg. per day; hence in the two supplemented groups the total amounts received daily were 55–65 and 70–80 mg. respectively.

RESULTS

The findings in the saturation tests done in April, 1942, are entered in table I. These should be compared with

TABLE I—EXCRETIONS OF ASCORBIC ACID IN 2½-HOUR TEST PERIOD (mg. per 10 stone body-weight)

Days of control period, before dosing: "resting level" (= blank)		Days of test-dosing				
1st	2nd	1st	2nd	3rd	4th	5th
GROUP A—*Unsupplemented basal diet* Intake = 20–25 mg. per day						
2·0	1·2	4·0	75*	105	121	161
2·4	2·2	3·1	27	92*	154	200
3·6	2·1	2·5	8	63*	117	135
1·5	1·9	3·1	4	56*	144	200
2·0	1·9	3·7	43	156*	188	136
1·7	1·6	2·5	6	51*	145	119
1·8	2·0	9·5	58*	118	168	152
1·8	2·0	2·3	4	53*	139	101
1·9	2·1	10·0	55*	115	164	141
1·7	2·0	3·1	18	100*	174	153
2·0	2·6	19·8	76*	94	158	126
1·9	2·3	13·0	90*	154	166	235
GROUP B—*Supplemented with 15 mg. ascorbic acid* Intake = 35–40 mg. per day						
2·5	1·7	28	94*	139	172	164
2·5	2·5	67*	117	150	352	200
2·0	2·3	28	67*	146	222	130
1·8	2·2	85*	96	152	178	170
2·5	2·6	30	73*	158	174	182
1·6	2·4	73*	124	154	142	158
1·5	5·1	7·3†	76*	196	302	256
1·7	2·4	61*	138	154	236	158
1·9	2·9	94*	138	166	120	152
2·1	2·4	26	126*	180	218	148
2·1	2·8	46	75*	152	215	194
GROUP C—*Supplemented with 25 mg. ascorbic acid* Intake = 45–50 mg. per day						
1·3	1·7	104*	149	182	202	156
2·3	3·5	172*	146	191	225	212
2·2	2·5	63*	138	190	186	170
>0·4‡	1·9	130*	149	174	198	180
1·8	1·6	70*	136	194	164	182
2·1	2·0	142*	171	210	>72‡	181
5·4	4·3	308*	348	315	267	460
2·1	2·4	125*	147	160	247	154
4·6	3·5	139*	144	164	205	196
2·1	2·7	122*	157	214	188	197
2·4	3·2	93*	170	202	228	188
2·5	2·6	87*	160	178	156	208

* Denotes approach of saturation.
† Excluded from average as he had been at the Home only 1 month.
‡ Excluded from average, part of sample of urine lost.

* The interval of 6 months or more allowed between the successive saturation tests has been proved by past experience to be long enough to ensure that the effect of previous saturation in building up the "reserves" has worn off. Vitamin C is not stored in the body to the same extent as, for example, the fat-soluble vitamins.

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the data for the responses at higher levels of intake in autumn 1941 (see fig. 3 and table I, Harris 1942a). An analysis of the results in both sets of tests is given in table II. The conclusion to be drawn is that past daily

TABLE II—GRADED RESPONSES WITH VARIOUS GRADED PAST INTAKES. SUMMARY

Date of test	Previous intake, mg. per day. Av. (and limits)	Total boys in group.	No. of boys approaching saturation on (days)—					
			1st	2nd	3rd	4th	5th	6th
Autumn 1941	75 (70–80)	12	12	0	0	0	0	0
	60 (55–65)	10	10	0	0	0	0	0
	45 (40–50)	10	9	1	0	0	0	0
April 1942	47 (45–50)	12	12	0	0	0	0	0
	37 (35–40)	11	5	6	0	0	0	0
	23 (20–25)	12	0	5	7	0	0	0
Spring 1941	Various. Poor working-class, wartime diets mostly <20	29	1	4	8	11	3	2
Spring 1938	Working-class pre-war, for comparison	35	10	11	9	5		0

intakes of the order of 75, 60, 50, 45 mg. give first-day responses, in decreasing order of magnitude. With an intake of 35–40 mg.—i.e., slightly above the League of Nations' standard of 30 mg.—first- and second-day responses result. With intakes slightly below the LoN standard—namely, 20–25 mg. per day—second- and third-day responses are seen. In keeping with this, earlier surveys showed that children with still lower intakes did not reach saturation until the fourth or fifth day or beyond. Thus, in confirmation of earlier conclusions, the dividing line, if the LoN value is accepted as standard, is a response after the second day. It is worth noting that relatively little "scatter" is seen in different subjects on the same intake—in other words, it cannot be argued that individual variation from one subject to another seriously influences the validity of the test.

CONCLUSIONS AND COMMENTS

Standards.—We can safely conclude from our findings that an intake corresponding with the LoN requirement (30 mg. per day), or an amount not appreciably in excess of it, will suffice in virtually all subjects to give the specified response by the second day of test-dosing. With intakes appreciably below the LoN standard 3 days and upwards are needed for saturation. The number of days taken, beyond the second, before the response is obtained gives the index of the extent of the deficit in the past intake as compared with the LoN standard. The extreme limit is that reached in cases of developed scurvy when some 7–10 days are needed before saturation is attained. At the other end of the scale, with standards of intake above the LoN figure —e.g., the 50–75 mg. per day recommended by some American authorities—there is saturation on the first day of dosing (the excretion being almost maximal with 50 mg. and fully so with about 75 mg.).

Individual variations; conditioned deficiency.—It might have been supposed that subjects differ so much in their individual requirements for the vitamin or in their response to test that the validity of the method would suffer. However, as has been mentioned above, the fact that there is little scatter in the responses of subjects in the same group indicates that the method can be used satisfactorily as an index of the level of the past intake. The occurrence of rare cases of conditioned deficiency, due to faulty assimilation rather than to a low intake, does not affect the argument: the requirement of such subjects is raised and the test indicates it. Likewise in fever, the need for vitamin C appears to be increased; this is reflected in saturation tests, a patient with an infectious disease (notably phthisis) giving a lower response than that of a normal subject on the same previous intake (Abbasy, Harris and Ellman 1937).

Standards for adults.—The tests recorded above were carried out on children of 8–14, and the question arises: How far are the standards proposed applicable to adults? The answer seems to be that, although admittedly no such extensive, or quite such precise, measurements have yet been completed with adults, there is evidence that the same criteria hold with sufficient accuracy for ordinary purposes. Indeed, the observation of a 7–10 day deficit as characteristic of advanced vitamin deficiency (developed scurvy) rests mostly on observations on adults; and it can also be stated that the amount of vitamin C in a man's past diet needed to bring him to saturation on the second day of dosing is certainly not seriously in excess of 30 mg. per day (LoN standard), while an intake of around 50–75 mg. again means first-day saturation, again as with the children examined. The different absolute needs of infants, children and adults are allowed for with sufficient accuracy for most purposes by the procedure recommended—that is, by dosing in proportion to the body-weight and expressing the excretion on a similar basis (for further discussion of this point see Harris 1940, 1942). We are not ruling out the possibility that an additional refinement of the standards for infants and adults may be reached as further standardisation work proceeds. For the time, however, it can be claimed that age differences are not of fundamental importance, and in any case comparative figures of the number of days taken to saturate do indicate the relative degree of saturation or unsaturation of different groups under examination.

Significance of saturation-test results.—Much confusion has been caused by the unwarranted assumption made by some writers that the test is based on the presupposition that a state of saturation is physiologically desirable. Others seem to have been under the misapprehension that the sole object of the test is to detect a condition of clinical deficiency. I have made neither assumption, either here or in earlier publications. The purpose of the saturation test is to say whether the intake has been above or below some accepted standard of intake, and if below how much below. Whether saturation is desirable or not is beside the point. It is also sometimes argued that since such a large proportion of subjects are found on test to be "below standard" and are yet in apparently good health there remains some doubt as to the value of the method. As indicated above, the fallacy here is to suppose that a substandard intake necessarily implies clinical evidence of deficiency. The purpose of the test is to tell the observer about the level of nutriture of the subject. This can be roughly classified in grades, as "excellent" (daily intake of ascorbic acid $\geq$50–75 mg. daily, USA optimum standard, marked by good first-day response); "satisfactory" (30 mg. daily, LoN standard, marked by first- to second-day response); "below LoN standard" (<30 mg., marked by response later than second day, in proportion to extent below); or "very low" (falling to limit of seventh- to tenth-day response in cases of established deficiency disease). What we can say therefore is that a subject who takes 5 or 6 days to saturate is dangerously low and near the scurvy limit, or that one who saturates on the second day has a satisfactory intake judged by the LoN standard. It is of course admitted that an intake less than the LoN standard is common and does not necessarily imply obvious ill health. This is not the same however as admitting that the standard of 30 mg. per day should be relaxed in the absence of an authoritative alternative.

There is sufficient evidence of the reality of the "subclinical," or "partial," deficiency which results when the intake is enough to prevent deficiency disease but not enough for optimal health. Much evidence can be cited of the improved physique and lowered incidence of infection in apparently normal children given extra vitamin C (see, for example, papers quoted by Harris 1942b). Incidentally, in our own tests the children receiving the supplements of vitamin C have had less infectious disease, including dysentery, than those on the basal diet; but with the relatively small numbers with which we have been concerned a further continuation of these trials is needed before the differences can be expressed in adequate statistical form.

In a period of 13 months (November, 1941–November, 1942, inclusive), 9 cases of infectious illness involving absence from school were recorded in the 12 boys on the institutional diet alone, 6 cases in the 12 boys on 15 mg. of added ascorbic acid (blackcurrant juice) and only 3 cases in the 12 boys on 25 mg.

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I am informed that the chances are about 24 to 1 against the difference noted between the first and the last groups having been due to random variation. There was also a similar decrease in the average duration of illness with the increasing supplements of vitamin C.

SUMMARY

Groups of boys (12–36 in each group) at a residential home were kept on a basal diet of known vitamin-C content and given in addition various graded supplements of vitamin C, natural and synthetic, over periods of 3–4 months or longer, so that each boy in a group received the same intake. About twice a year, an interval found to be long enough to allow the effect on their "reserves" of any previous saturation test to become negligible, the boys were tested by the standardised procedure previously described, 700 mg. of ascorbic acid per 10 stone body-weight being given daily and the number of days counted until the approach of saturation (taken as an excretion of 50 mg. or more per 10 stone in the 2½-hour specimen collected around the fourth and fifth hour after each test dose).

Results were found to be graded as follows:—daily intakes of 75, 60, 50 and 45 mg. gave first-day responses of decreasing magnitude; 37 mg., first- to second-day responses; 23 mg., second- to third-day responses, the "scatter" in the responses of subjects kept on the same level of intake being small. In earlier tests, children on still lower intakes had third-day to fifth-day responses. Similar graded results have been recorded with adults on varied intakes, patients with scurvy taking about 7–10 days to saturate.

As a standard of reference in assessing results of surveys, it is noted that an intake corresponding with the LoN requirement (30 mg.), or an amount not seriously in excess of it, suffices in virtually all subjects to give responses by the second day of dosing. The number of days beyond the second may be taken as an index of the relative deficit in the past intake. For high and low base lines, respectively, it is observed that with intakes of the order of 50–75 mg. per day (the optimal standard recommended by some American authorities) saturation is attained on the first day of dosing, whereas with intakes appreciably below the LoN standard 3 days and upward are needed, reaching a limit of some 7–10 days for cases of developed scurvy. These criteria agree with those previously suggested.

The saturation test does not presuppose that saturation is necessarily physiologically desirable. "Substandard" is not synonymous with "clinically deficient," and there are degrees of partial deficiency between optimum nutrition and frank avitaminosis.

Mr. A. Ward has given skilled help with the titrations, and Dr. J. O. Irwin has kindly advised me on some statistical points. I am indebted to Messrs. Roche Products for the ascorbic acid and to Messrs. Chivers & Sons, Ltd., for the blackcurrant purée.

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SPONTANEOUS REDUCTION EN MASSE OF AN INGUINAL HERNIA

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REDUCTION en masse of a strangulated hernia may be defined as the displacement of the hernia tumour without relief of the strangulation. According to Pearse (1931), in 60% of cases the condition is the result of attempts at reduction by the doctor or by a friend and in 35% it is due to the manipulations of the patient (autoreduction en masse); in 5% the reduction is spontaneous. The following is an account of a case which recovered from the rarer type of spontaneous reduction en masse accompanied by perforation of the small intestine.

CASE-REPORT

A man of 39 had had a reducible left inguinal hernia for 3 years. He was well-built and had not recently lost weight. He had never worn a truss. Eight days before admission he was on his way to work when he was seized by violent abdominal pain which was followed by vomiting. The pain increased in intensity as the day went on. There was no history of bumping or of any strain of any kind, nor was there any history of the rupture having been touched either by the patient's doctor or friends or by himself—his reply to questioning was, "I guess it just happened." After the onset of the pain he vomited frequently and passed neither fæces nor (as far as he remembered) flatus. Next day he consulted his doctor and was treated by daily enemata until his admission to hospital a week later.

On admission his tongue was lightly coated. He complained of slight pain over the left external inguinal ring. Liver dullness was not increased. There was no abdominal rigidity and no palpable abdominal tumour but some tenderness was present just above the left inguinal ligament, the left inguinal canal being empty. Borborygmi could be heard on auscultation and rectal examination was negative. There was slight abdominal distension. The vomitus did not appear to be fæcal but smelt very sour. Neither a soap enema nor a turpentine one an hour later produced flatus or fæces. Temperature 98·6° F., pulse-rate 96 and respirations 22 per min. The tentative diagnosis of hernia reduced en masse was made.

Operation.—Light 'Nupercaine' spinal anæsthesia was given by the Etherington Wilson technique and the abdomen was opened by a left lower paramedian incision. In the region of the left internal inguinal ring a mass was found bulging upwards and a coil of ileum was seen passing into the internal ring. The sac was in the common "properitoneal" position. Its neck had become thrust into the peritoneal cavity, the sac itself being drawn upwards and inwards; in this way the constricting effect of the sac had been increased and strangulation had resulted. The strangulating agent was the neck of the sac. The abdominal wound was covered with a towel and a left inguinal incision was then made and the sac retrieved, aided by the assistant's hand in the abdomen according to the procedure suggested by Hamilton Bailey (1936); this avoids spilling infected fluid into the peritoneal cavity. The sac was then dealt with as in an ordinary strangulated hernia; it was opened and the loop of bowel drawn down. Opposite the constricting site—i.e., the neck of the sac—was a gangrenous patch on the bowel about an inch in diameter which perforated during the manipulations. The perforation was sewn over, the gangrenous patch invaginated and the loop returned to the abdominal cavity. The abdominal wound was closed in layers. The hernial sac was obliterated and a Bassini repair performed with the inguinal incision drained by rubber dam drainage.

Postoperative course.—Anti-gas-gangrene serum, 3000 units, was given, and a duodenal tube was passed for 48 hours and the intestinal contents aspirated, while continuous intravenous drip saline was administered. In all, 22 pints of glucose saline were given. A course of sulphapyridine was given. On the 6th day the patient developed a cellulitis of the scrotum which subsequently resolved satisfactorily; the inguinal wound broke down and secondary suture was carried out later. He was discharged 4 weeks after admission. A year later he is perfectly well, has put on weight and is doing his normal work at a munitions factory.

DISCUSSION

According to Romanis and Mitchiner (1937) hernial reduction "en masse" should never occur because "it must entail considerable violence for its production." This case, however, occurred in a healthy man on his way to work and is an example of the rarer type—the spontaneous one—which according to Pearse (1931) occurs in only 5% of herniæ strangulated en masse (7 times in 138 cases). Thus in 95% of cases taxis is responsible for the reduction en masse, and this is one reason for the substitution of early operation for taxis in the treatment of strangulated hernia. In the case here described there had been no loss of weight, there was no special laxity of the adbominal walls and no truss had been worn—all features of most of the recorded cases. Pearse reviewed 193 cases and studied the pathological anatomy of 110 of them. In 93% the sac was displaced to the properitoneal position and in 7% the false reduction took place by rupture of the sac and displacement of only the strangulated viscus. In each of these conditions two varieties occur. In roughly 5 out of 6 of the properitoneal type, the usual

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result of reduction en masse is to force the sac and strangulated contents to a properitoneal position; this is the most usual finding and the case reported is of this type. In the sixth case the strangulated viscus is displaced from the inguinal canal into a properitoneal diverticulum at the neck of the sac without disturbing the inguinal sac. Two varieties of the more unusual condition where rupture of the sac occurs are also found. The first, described by Blackman (1846) is rupture of the posterior wall of the sac with displacement of the bowel behind the pubis. The strangulation persists from pressure at the neck of the sac or at the point of laceration of its wall. The second type results from invagination of the sac "like the finger of a glove turned inside out" with the tearing off of a collar of tissue which strangulates a loop of bowel free within the abdomen. Reduction en masse by rupture of the sac is caused by violent manipulation and there have been no recent reports of this condition. The presence of a properitoneal diverticulum of an inguinal hernia is important in bringing about reduction en masse; according to Halstead (1906) the main factors causing this diverticulum are: (*a*) pressure of an imperfectly fitting truss which closes the external ring but not the canal; (*b*) repeated and unrestrained efforts at reduction of an inguinal hernia which has a narrow neck to its sac; and (*c*) congenital defects such as undescended testicle, narrow external ring or congenital properitoneal diverticulum.

A striking feature of this case was the length of time elapsing between the reduction and operation. In the case reported by Pearse the reduction en masse did not result in complete strangulation but was followed for some reason by an interval of 3 weeks during which the patient was free from symptoms before gangrene of the bowel developed which necessitated resection. Walsham (1901) reports a case in which a free interval of 2 months occurred before there was a return of strangulation.

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EFFECT OF EMOTIONAL SHOCK ON HORMONE RELEASE AND ENDOMETRIAL DEVELOPMENT

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Histological examinations by PROF. EMIL NOVAK, *Johns Hopkins University, Baltimore*

THE endometrium is the mirror in which are reflected all the hormonal happenings which take place in the anterior lobe of the hypophysis and in the ovary. Every healthy woman shows at a certain time of her menstrual cycle a certain endometrium. But the monthly renewed birth, life and death of this mucous membrane, the tempo of its development, is subject not only to hormonal factors but to every kind of psychic factor also. The emotional tension to which women are more than ever liable during the war, can bring about changes in the building up of the endometrium by influencing, via the hypothalamus, the autonomous nervous system and the release of gonadotropic hormones in the hypophysis.

It has long been known that psychic trauma may alter the menstrual rhythm, but up to now no visible proof of this has been forthcoming. The following four cases seem to demonstrate that emotions do sometimes produce amenorrhœa by disturbance of hormone release.

CASE-RECORDS

Four women who had always menstruated regularly, with normal genitals and otherwise healthy, had an emotional shock during the aerial bombardment of London. In three cases high explosives burst nearby, and though the patients were not injured they were excited for days after the shock, talked more than usual and could not sleep.

Professor Novak, who examined all the biopsy specimens of endometrium histologically, was in each case unaware of the dates of the last period and of the curettage.

CASE 1.—An unmarried woman, aged 30, whose last menstrual period began on Jan. 21, 1941. During the day of Jan. 31, the 10th day of her menstrual cycle, a bomb exploded near her. She had a menstrual cycle of about 32 days. She expected her next period about Feb. 22, but this was missed. She thought she might be pregnant and consulted me when menstruation was overdue, but a Friedman test was negative and the genitals normal. On March 1, after amenorrhœa of about 10 days, 38 days after the last menstruation and 28 days after the shock, a stroke curettage was performed.

The specimen of endometrium was examined histologically by Professor Novak, who reported as follows. "The endometrial pattern represents a postmenstrual type of endometrium corresponding to about the 6th or 7th day of the ordinary four-week cycle. The glands are extremely small and narrow with almost no tortuosity and the surface epithelium is very low so that it seems safe to assume that this endometrium was removed early in the cycle."

Since this patient's cycle was 4 days longer than the ordinary one of 28 days, the shock occurred on what corresponded to the 6th day of an ordinary menstrual cycle.

CASE 2.—An unmarried woman, aged 39, whose last menstrual period began on April 27, 1941. The shock took place on the night of May 10, the 13th day of her cycle. She had a 30 days menstrual cycle. She thought she was pregnant when she missed her next period, but a Friedman test was negative. After 14 days of amenorrhœa a stroke curettage was performed (June 7), 41 days after the last period.

Professor Novak reported "that this endometrium corresponds to what one finds at approximately the 12th day of the cycle. There is moderate tortuosity in some of the glands and the surface epithelium is of moderate height." The patient's cycle was 2 days longer than the ordinary, so that the shock occurred on what corresponded to the 11th day of an ordinary cycle.

CASE 3.—A married woman with one child, aged 28, regularly menstruating every 28 days, had her last period on April 22, 1941. She was close to a bomb explosion during the night of May 10, the 18th day of her cycle. The next menstrual period was missed. A Friedman test was negative and after 11 days of amenorrhœa, on the 39th day after the last menstruation, a stroke curettage was performed.

Professor Novak found an endometrium "corresponding to the picture to be expected somewhere between the 16th and the 18th days of the cycle. The surface epithelium is quite tall, as would be expected at this time. Many of the gland epithelial cells show the typical subnuclear vacuoles which are so frequently seen at around the time of ovulation."

CASE 4.—An unmarried woman, aged 42, who on the 15th day of her menstrual cycle (28 days) forgot her contraceptive during intercourse and from this night on got nervous and had the idea that she had conceived. She had always had normal and regular periods, and when her period was overdue for 2 days only her nervous tension became so great that she felt sick, and was so frightened of being pregnant that a Friedman test had to be done to convince her of her error. The uterus was small and firm. The test was negative and a stroke curettage was performed on the 38th day after the end of the last menstrual period.

Professor Novak reported as follows. "This endometrium would seem to correspond to about the 16th or 18th day of the cycle. Here again the surface epithelium is fairly tall and there is quite a number of subnuclear secretory vacuoles as well as marked œdema of the stroma."

No hormone therapy was given in the first three cases, as I thought that sedatives would work better. Normal menstruation began after 7 and 8 weeks in cases 1 and 2; in case 3 menorrhagia started 8 weeks after the last normal period. In the fourth case three injections of prostigmine were given, the first 8 hours before the stroke curettage, and the second and third on the next 2 days. Menstruation followed 24 hours after the last injection. All four patients menstruated normally and regularly later.

Professor Novak's findings show that the normal development of the endometrium was arrested on the very day the emotional shock occurred. The emotional shock must have had an effect via the autonomic nervous

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system on the release of the gonadotropic hormones—an effect already recognised but here demonstrated histologically.

SUMMARY

Four women who had always menstruated regularly missed a period after an emotional shock. Histological examination of biopsy specimens showed an endometrium at the stage of development it would normally have reached at the time of the shock, suggesting that the shock caused an immediate arrest of development by interruption of the release of the proper hormones.

VOLKMANN'S ISCHÆMIA OF THE LEG

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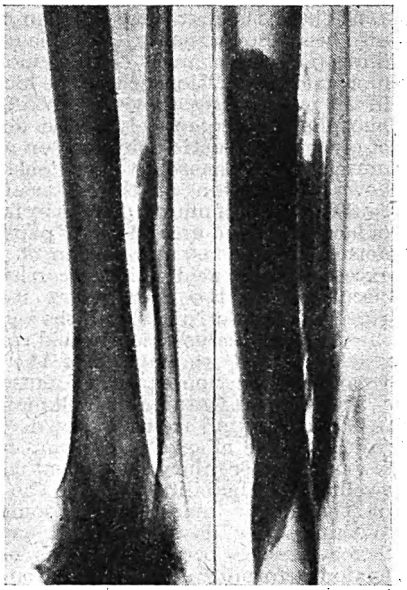
SOME cases have come under our notice which suggest that Volkmann's ischæmia affecting the muscles of the anterior tibial compartment must be rescognised as a definite clinical entity with striking sequelæ.

CASE-HISTORIES

CASE 1.—A man of 47 sustained a gunshot wound of the left thigh in the war of 1914–18, causing an injury to the femoral artery and vein. Both vessels were ligated in the adductor canal. After recovery, he was able to work as an engineer, but always complained of a painful dropped foot. In July, 1940, pain and swelling on the outer aspect of the leg were noticed, finally necessitating his admission to hospital. Several incisions were made over the affected area in February, 1941, from which chalky masses and fluid resembling pus but sterile on culture were evacuated. After immobilisation in a plaster cast the wounds healed and he was able to return to work. In July, 1941, his general condition was good, he was apyrexial and there was no obvious focal sepsis. The left lower limb showed healed scars over the adductor canal and the anterior tibial compartment. The anterior crural muscles (tibialis anticus, extensor digitorum communis and extensor hallucis longus) were not acting, their tendons standing out, fixed and cord-like. He had dropped foot; the tendo achillis was tight, maintaining the deformity. Some power remained in the peronei. The first metatarsophalangeal joint was fixed in extreme dorsiflexion, with pain, tenderness and callosity under the head of the first metatarsal. Cutaneous sensation was normal. Blood-calcium 9·8 mg., blood-phosphorus 4·17 mg. per 100 c.cm. X rays (fig. A) revealed a small calcified mass at the junction of the lower and middle thirds of the tibia and fibula, independent of these bones; this was all that remained after the second operation.

CASE 2.—A man of 48 was injured by a bomb explosion in the war of 1914–18. He sustained a compound fracture of the left leg, which was trapped by a falling beam, while the right leg was buried in debris up to the middle of the thigh; he was not released for 13 hours. The fractured left leg healed completely without residual disablement. The right leg was very swollen for some days, but no external wound was present; he was left with a dropped foot and always complained of pain on the outside of the leg. Nevertheless, he was able to return to his work as a bootmaker. Five years before, he had been admitted to hospital with a swelling in the anterior tibial region; his symptoms were then relieved by repeated aspirations of sterile pus. X rays revealed extensive calcification in the anterior tibial compartment. In April, 1941, the swelling recurred. There was a diffuse tender swelling over the middle third of the anterior tibial compartment, fluctuant at its centre, and with stony masses palpable under the skin. He had equinovarus with callosity on the outer margin of the sole, a tight tendo achillis preventing passive dorsiflexion, and none of the muscles of the anterior tibial compartment (including the peronei) was acting. Full passive movement was present at the first metatarsophalangeal joint, which was held slightly plantar-flexed, and there was no cutaneous sensory loss. Blood-calcium 9·5 mg., blood-phosphorus 4·10 mg. per 100 c.cm. X rays still showed massive calcification in the anterior tibial compartment (fig. B). The anterior tibial compartment was exposed through a long incision. The muscles were found to be replaced by fibrous tissue, yellowish in colour, with a small area of liquefaction. On incision of the muscles there was no bleeding, but large calcified masses were encountered. As much as possible of the dead tissue was excised. The wound was closed without drainage, and healed by first intention. The material removed at operation was necrotic tissue, sterile on culture.

CASE 3.—A man of 45, injured in an air-raid in May, 1941. The right leg was buried in debris for 9 hours to a level of 3 in. above the knee. The skin was not lacerated, nor was there any fracture. When seen next day by a colleague, swelling was such, especially on the outer side, that gangrene was thought to be impending. Incisions made to relieve tension showed purplish congested muscle in the anterolateral compartment of the leg. No hæmatoma was found, and only a little bloodstained serous fluid exuded. Treatment consisted of rest in bed and simple dressings without splinting. When we first saw him 3 months later, the muscles of the anterior tibial compartment were replaced by a hard painless swelling with slight overlying œdema; there was dropped foot, all the muscles of the anterior compartment including the peronei being affected. No abnormality could be detected in the calf muscles. Slight sensory loss was observed over the sole and the outer part of the dorsum of the foot (i.e., in the area of the posterior tibial nerve); further observation has shown that this is rapidly recovering. The affected area was explored and no muscle could be seen with the naked eye: the appearance was that of newly formed, slightly œdematous fibrous tissue, pale yellow and with very slight bleeding. Portions taken for histological examination consisted of dense collagenous fibrous tissue containing small blood-vessels. There was no trace of surviving normal muscle-fibres such as one might expect to find after a simple direct injury, nor of the wasted fibres found in paralytic replacement fibrosis. Radiography has not yet shown evidence of calcification.



A B

A = Case 1, after operation. Residual calcification in anterior tibial compartment.

B = Case 2. Massive calcification in anterior tibial compartment.

DISCUSSION

The injuries sustained in these three cases were: in case 1, gunshot wound of the thigh with ligature of femoral artery and vein; in cases 2 and 3, crush injury of the leg to the level of mid-thigh. The result common to all three was destruction of the muscles of the anterior tibial compartment and their replacement by fibrous tissue. It is therefore reasonable to inquire whether a common cause had been acting. The possibilities which suggest themselves are direct injury to the muscles, a peripheral nerve lesion or a vascular lesion. The evidence is against the first view, for in case 1 there was no direct injury to the muscles, while in the other two cases destruction of muscle was complete, yet absolutely restricted to one particular group. Against the second view, it may be argued that in no case were any atrophic muscle-fibres seen as might be expected if this was a paralytic replacement fibrosis, nor was there any cutaneous sensory change in the area supplied by the anterior tibial nerve; in case 3 the rapidly recovering sensory loss was of posterior tibial distribution. We therefore put forward the view that the changes have been brought about by a vascular injury, and we shall attempt to show that injuries to the arterial blood-supply or to the venous drainage can produce irreversible coagulation of the muscle proteins and also an inflammatory reaction on the part of the connective tissues;

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and that these are the essential changes in Volkmann's ischæmia.

Recent advances in physiology have shown that muscular activity is accompanied by several linked chemical reactions which may be represented as follows:

1. Adenylpyrophosphate + glycogen → adenylic acid + fructose diphosphate.
2. Adenylic acid + phosphagen → adenylpyrophosphate + creatine.
3. Fructose diphosphate + creatine → phosphagen + lactic acid.
4. Lactic acid + oxygen → 4/5 reformed glycogen + 1/5 carbon dioxide and water.

Of these, the first three reactions are anaerobic. It has also been shown that irreversible gelation of the muscle-fibres (i.e., the changes of rigor mortis) can be produced, first, under conditions where the lactic acid concentration in the muscle rises above 0·5–0·65%, and secondly, when phosphagen is completely broken down. And breakdown of glycogen to lactic acid goes on slowly even in resting muscle under anaerobic conditions. Thus it can be seen how interruption of the arterial blood-supply could cause gelation of muscle protein by favouring the formation of lactic acid and breakdown of phosphagen. Again, under normal conditions, stimulation of a muscle produces an excess of lactic acid which is carried away by the venous circulation to the liver, where it is re-synthesised to glycogen (the Cori cycle). If the venous return is impeded the threshold value of lactic acid concentration is quickly reached; and we have here the mechanism whereby venous obstruction can cause muscle coagulation.

The clinical features of Volkmann's ischæmia as seen in the upper limb are well known. The lesion follows an injury to the elbow or forearm, usually a fracture. A few hours after injury the patient complains of numbness, swelling and inability to move the fingers, with stiffness of the flexor muscles and sometimes intense pain. Within a few days pain and swelling disappear, the flexor muscles become hard as board and the typical flexion deformity develops (flexion of the elbow, flexion and pronation of the wrist, dorsiflexion of the metacarpophalangeal joints and flexion of the interphalangeal joints). Often there is loss of the radial pulse and pallor of the fingers at the onset, but in other cases the fingers are cold, livid, cyanotic and swollen. The syndrome has sometimes developed before any treatment for the injury—such as acute flexion of the elbow, or the application of plaster or splints—has been carried out; it must then be attributed to an intrinsic mechanism. Nerves may be damaged either at the original injury (the median or ulnar, for example, in supracondylar fractures), or later, by getting involved in scar tissue. The deformity can largely be prevented by early splinting of fingers and wrist in extension, but the amount of voluntary movement is not improved by this procedure.

Investigators agree substantially about the histological findings. Leser, in 1884, described a case seen 6 weeks after onset, and noted that the muscle-fibres showed evidence of degeneration, being swollen and fragmented; leucocytic infiltration with growth of cellular connective tissue had completely replaced the muscle in many areas. Powers (1907) described the appearances in a case 16 months after the injury. There was great hyperplasia of connective tissue around and between the muscle-fibres, and in some areas there was no muscle tissue at all; where any remained, the fibres were atrophic and fragmented or showed hyaline degeneration. There was some fatty infiltration of the fibrous tissue. Bristow's (1923) case (reported on by Greenfield) showed similar changes. The muscle-fibres showed evidence of degeneration—cross-striation was accentuated, the fibres were swollen and fragmented. The nuclei of the sarcolemma proliferated and surrounding leucocytes were ingesting the dead muscle-fibres. The position was succinctly summed up by Greenfield in these words: "the dead muscle acts as a non-septic, non-irritating foreign body and is treated as such by the surrounding tissues."

The most important experimental studies are those of Brooks (1922) on dogs. He first demonstrated that in permanent occlusion of the main arteries of a limb either the collateral circulation was sufficient to restore conditions to normal, or sharply demarcated gangrene (affecting skin more than muscle) developed. In a second set of experiments he induced temporary arterial occlusion for 12–17 hours; extensive necrosis of muscle-fibres followed, without inflammatory reaction, but if the tissues were examined 4 days later, after release of the obstruction, there was œdema and leucocytic infiltration in addition. We believe this represents an inflammatory response of the living tissues to restoration of blood-supply and the presence of dead muscle-fibres. In a third set of experiments, the venous drainage alone of an isolated muscle was obstructed. This resulted in rapid onset of changes typical of Volkmann's ischæmia—early extravasation of blood in and around the muscle, necrosis of muscle-fibres, œdema, leucocytic infiltration and later progressive fibrosis. Presumably increase in venous pressure raises the intracapillary pressure so that the local circulation comes to a standstill; there is anoxia and failure to remove metabolites—two conditions which have been shown above to favour muscle necrosis. The walls of the capillaries are damaged so that their permeability increases; œdema develops with diapedesis of red blood cells. Leucocytes escape into the region of dead muscle-fibres and begin to ingest the fragments. The fixed connective-tissue cells also begin to proliferate, and when the dead tissue has been removed the process ends as a fibrosis.

For a time the venous obstruction theory held the field, and was supported by many authorities. Murphy (1914) advised the evacuation of subfascial hæmatomata pressing on the veins. Sir Robert Jones (1928) stressed the importance of straightening the limb when hyperflexion of the elbow had produced kinking and obstruction of the veins. Middleton (1928) pointed out that the venous trunks draining the muscles attached to the medial epicondyle collected into one main trunk in the antecubital fossa which could easily be obstructed. Jepson (1926) found that the application of a tight Esmarch bandage to the thigh of a dog produced no permanent contracture, but that if the femoral vein had been first ligated the application of the bandage for 12–14 hours caused a lasting contracture.

More recently the arterial obstruction theory has returned to favour. It was supported by most of the earlier authorities including Volkmann himself, who thought the lesion was due to ischæmia of the muscles. Lately, many workers (Leriche 1935, Griffiths 1938, Cohen 1940–41) have described cases where, at operation, spasm, contusion or embolism of the brachial or femoral arteries has been demonstrated in association with the Volkmann syndrome in the forearm or calf muscles. In these cases, a useful clinical sign is loss of the radial or tibial pulse at the onset of symptoms. Arteriography may reveal peripheral arteriolar spasm. Treatment aims at relieving arteriospasm or removing intravascular clot where this is present. Paravertebral block (in the upper limb) and spinal anæsthesia (lower limb) are sometimes successful. If these measures fail operation is undertaken. Often it is sufficient to remove thin clot from around the spastic or contused artery and bathe it in warm saline, when pulsation returns. Injection of papaverine into the blood-stream may relieve the spasm. Leriche recommends local periarterial sympathectomy or even arteriectomy. All observers agree that, to be successful, operation must be undertaken within 6 hours of the onset of symptoms.

Can we explain these facts in the light of the experimental evidence? First it is essential to realise that arterial obstruction in these cases is temporary: the circulation is either re-established spontaneously after a lapse of time by the opening up of collaterals, or else is restored by operation. Secondly, the arterial supply is not cut off long enough for massive gangrene to develop. Thirdly, the degree of anoxia has been sufficient to kill the highly specialised muscle-fibres, but insufficient to kill the less differentiated connective tissue. Hence when the circulation is restored this tissue responds to the presence of necrotic muscle by producing the changes of inflammation—œdema, cellular infiltration and later fibrosis. And since the return of the circulation determines the onset of the inflammatory reaction, operative intervention, to be of any value, must be undertaken early, and even then acts only by limiting the amount of muscle necrosis during the period of anoxia.

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Two apparently contradictory views can now be reconciled: there seem to be two types of the Volkmann syndrome, one due to temporary arterial obstruction, the other to venous obstruction; and in both of them death of muscle-fibres is followed by an inflammatory reaction and later fibrosis. In our own cases we concluded that a common (vascular) injury produced a common result (death of muscle and later fibrosis and calcification). We believe, therefore, that these were cases of the Volkmann syndrome affecting the anterior crural muscles and produced by injury to their blood-supply.

The deformity is brought about essentially by the contracture of the fibrous tissue which replaces the affected muscle-fibres; its character depends on various factors. Morphologically, the function of the upper limb is grasp, and that of the lower limb maintenance of the erect position. These postures are controlled reflexly, the tone of the muscles being determined by the discharge of impulses down the motor nerves along the final common path, from the anterior horn cells of the spinal cord. The afferent side of the arc includes "stretch" sensory endings in the antigravity muscles, pressure endings in the foot, touch endings in the hand and impulses from the vestibular apparatus and from the eyes. The centres in the central nervous system which play an important part in the maintenance of muscular tone include the corpus striatum, red nucleus and Deiters's nucleus. This is especially well seen when, in lesions affecting the pyramidal pathway from the cerebral cortex, the action of these centres is no longer subject to cortical inhibition. In such a case the limbs take up characteristic positions of exaggerated tone: spasticity, with extension of the lower limbs and plantar flexion of the feet, and adduction of the arms with flexion of the elbows, wrists and fingers. Every movement begins and ends in a tonic posture; in the lower limb the antigravity muscles (quadriceps and calf muscles) are the strong group, while in the upper limb the flexors are the more powerful and have the higher level of tone. When Volkmann's ischæmia affects the muscles arising from the medial epicondyle the extensors are relatively weak and do not resist the tendency of the fibrous tissue to contract. Thus the elbow flexes, the wrist flexes and pronates and the fingers flex. The accompanying loss of the lumbricals allows extension at the metacarpophalangeal range to occur. In Volkmann's ischæmia affecting the calf muscles, as described by Griffiths (1938), tone in the powerful antigravity muscles is lost; the weak extensors cannot prevent contraction of the fibrous tissue and thus pes equinus develops.

In our own cases the ischæmia affected the muscles of the anterior tibial compartment. Two factors combine to produce dropped foot: (1) gravity and the weight of the bedclothes in the recumbent patient, as is seen in other conditions of muscular weakness (e.g., recumbency in toxic states); (2) tone in the immensely powerful calf muscles is not abolished and is sufficient to overcome the tendency of the scar tissue to contract—a scar in its early stages can be easily stretched.

It is also possible to account for the minor deformities in our cases. In case 1 the extensors alone were affected, therefore pes equinus alone developed. When the patient got up and walked, his dropped foot passively dorsiflexed the great toe which became permanently fixed in this position. In case 2 the damage was more widespread, since in addition to the extensors the peronei were also involved. This resulted in a varus deformity as well as pes equinus; he was walking on the outer side of his foot as the callosity showed; thus fixed deformity of the first metatarsophalangeal joint did not develop. In case 3, too, all the muscles of the anterior tibial compartment were affected, and pes equinovarus resulted.

For calcification to occur, calcium and phosphorus intake must be adequate. Their absorption is modified by: the amount ingested; the vitamin-D intake which aids absorption; and the pH of the intestinal contents, because acidity favours calcium absorption. The skeleton is the storehouse of calcium and the phosphate radicle, and their level in the blood is controlled by parathormone. Increase in the amount of this hormone leads to increased excretion of the phosphate radicle in the urine, increase in calcium in the blood and decrease in calcium phosphate in bone. The enzyme phosphatase changes organic to inorganic phosphate, which then precipitates with the calcium ion to form insoluble calcium phosphate. It is present chiefly in the alimentary mucosa (where phosphate is absorbed), in growing bone (at the epiphyseal line and in the subperiosteal layer where phosphate is utilised) and in the kidneys (where phosphate is excreted). The richest source is growing bone, where it is formed by the osteoblasts. In dead and degenerating tissues lipoid breakdown leads to the formation of fatty acids. These are precipitated as calcium soaps, and are gradually converted to calcium phosphates and carbonates. On the basis of these facts it is reasonably easy to classify the conditions in which calcification or bone formation in abnormal situations occurs:

(*a*) *Heterotopic calcification.*

1. Hormonal.—In hyperparathyroidism calcification is seen in the kidneys, lungs and arteries owing to the high concentration of serum calcium and phosphate (Mandl 1936).

2. In experimental hypervitaminosis D calcification is seen in arteries and kidneys owing to increase in serum calcium and phosphate.

3. In sites of tissue degeneration and destruction—e.g., old hæmatomata, tuberculous abscesses, walls of blood-vessels (atheroma), and the pericardium. The cause here seems to be a breakdown of the lipoids leading to precipitation of calcium soaps and later change to calcium phosphates and carbonates.

(*b*) *Heterotopic ossification.*

4. Myositis ossificans circumscripta.—Bone is laid down in and around muscles, chiefly in the quadriceps and in the flexors of the elbow, usually after acute trauma, and in the adductors of the thigh, after repeated trauma ("rider's bone," Moore (1937)). The formation of the bone is thought in such cases to be due to the action of osteoblasts. In some instances they are actually liberated from the subperiosteal layer by avulsion of the periosteum (Davis and Hunnicutt 1915). In others there is metaplasia of mesenchymal connective tissue cells which begin to secrete phosphatase and hence become osteoblasts.

5. Myositis ossificans progressiva.—Here bone is formed in the myofascial planes all over the body. There may be an hereditary diathesis whereby the undifferentiated mesenchymal connective tissue cells take on an osteoblastic function as suggested by Virchow.

Leriche and Policard (1928) postulated three essential factors for calcification: an adequate local supply of calcium; an ossifiable medium (mesenchymal connective tissue); and a relatively poor blood-supply. Each of these may be further analysed. Thus the adequate local supply of calcium depends on absorption, hormonal control and the presence of phosphatase. The nature of the ossifiable medium brings in osteoblastic activity directly, or through metaplasia from undifferentiated mesenchymal elements. And hyperæmia washes away calcium and phosphate radicle and also phosphatase as it is formed (Taylor 1935); conversely when the blood-supply is poor, the blood tide is not so effective and sclerosis follows. This hypothesis is therefore a useful shorthand but is oversimple. It serves however to draw attention to the importance of the blood-supply of bone in determining its mineral content.

In cases 1 and 2 calcification was found in dead muscle. The most likely mechanism therefore seems to be the degenerative one: lipoid degeneration, formation of calcium soaps of fatty acids and later change to calcium carbonates and phosphates. The possibility of osteoblastic metaplasia in the fibrous tissue replacing the muscle cannot however be excluded. The factors concerned may also be translated into the language of Leriche and Policard (1928): there was a local source of calcium (dead muscle and neighbouring bone), an ossifiable medium (the replacement fibrosis) and direct evidence of diminished blood tide. Calcification in the leg is extremely rare; in describing 25 cases of myositis ossificans circumscripta from the Johns Hopkins Hospital, Geschickter and Maseritz (1938) found none below the knee.

The final low-grade inflammation in cases 1 and 2 was chiefly responsible for bringing them under notice. It developed many years after the original injury, and

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undoubtedly followed the calcification. In case 2 calcification had been observed radiologically five years before; and in case 1 the large chalky masses were seen within a few days of the onset of pain and swelling—much too quickly for the deposit to have been formed then. In neither case could any organism be grown on culture. It is, therefore, considered that this was a reaction to the presence of an inorganic irritant.

We think these cases* are examples of a syndrome not previously described, the salient features of which are: ischæmia of the Volkmann type affecting the anterior crural muscles; resultant deformity; late calcification; and final aseptic inflammation. Some suggestions for treatment may be derived from the discussion. The existence of an ischæmic syndrome in the leg is an additional reason for deprecating the use of the immediate skin-tight plaster cast after acute trauma; indeed, it is possible that some of the equinus deformities following fracture treatment may be due to this condition. Early incision to relieve tension or to evacuate any hæmatoma may arrest the ischæmic process. In cases where the dorsalis pedis is not pulsating, a spinal anæsthetic should be tried. If this fails to restore the circulation then the femoral artery should be explored; spasm or contusion may be found. Often cleaning away fine clot and areolar tissue from around the site of the lesion and bathing the artery in warm saline are sufficient measures to overcome the spasm. Papaverine injection may prove effective, or periarterial sympathectomy. Though active dorsiflexion may not be regained, early splinting of the foot in right-angled flexion will prevent foot-drop. In the established case, necrotic or calcified tissue should be excised. The deformity may be benefited by a boot with a drop-foot stop and lateral iron and spring. The resultant deformity is much less disabling than the corresponding one in the forearm.

SUMMARY

Three cases are described showing: vascular injury in the leg; ischæmia of the muscles of the anterior tibial compartment; resultant dropped foot; massive late calcification and abscess formation (in two cases).

The ischæmia is thought to be of the Volkmann type and the view is put forward that the onset of this malady is dependent on either temporary arterial obstruction or venous occlusion, and that the nature of the resultant deformity depends chiefly on muscle tone in the affected part.

The possible deleterious effect of the skin-tight plaster cast, and the importance of early surgical intervention in cases of the arterial type are noted. Adequate splinting will prevent the onset of deformity but cannot restore power to the affected muscles; in the established case a drop-foot shoe with spring and lateral iron gives a good functional result; and the chalky deposits and abscesses of the late stage require removal.

It is suggested that more of these cases may be seen under war conditions, and also that instances of calcification may possibly be demonstrated in old-standing examples of Volkmann's ischæmia in the upper limb.

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* Two more cases of anterior tibial ischæmia with calcification have been seen since this paper was written.

OBSERVATIONS ON CTAB (CETAVLON) ITS USE IN SURGERY

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THE surgical use of CTAB (cetyl trimethyl ammonium bromide) was first suggested by Barnes (1942) in his notes on the detergent and disinfectant properties of this substance. In this paper we record a number of investigations of CTAB which we made to confirm and extend those of Barnes and to determine its suitability for surgical purposes, particularly as a disinfectant in gloveless surgery. Our observations cover its general bactericidal properties, its value as a cleansing agent, and as a steriliser of the skin, both of patients and surgical personnel.

BACTERIOSTATIC AND BACTERICIDAL PROPERTIES OF CTAB

The disinfectant powers were tested by seeding standard inocula, usually between 5000 and 20,000 viable organisms, into dilutions of CTAB made in nutrient broth for aerobes, and in thioglycollate broth for anaerobes. Bacteriostatic titres were judged by the absence of visible turbidity (inhibition of growth) after 18 hours' incubation. After this period, it was found that within the limits of the 3-fold dilution series employed in the tests, the bacteriostatic and bactericidal titres were similar. The distinction between growth-inhibition and death in non-turbid CTAB-broth cultures was made by adding the mixtures to more broth, so that the CTAB was diluted well below its bacteriostatic concentration, and re-incubating. Table I shows the distribution of these titres

TABLE I—MINIMUM CONCENTRATION OF CTAB IN BROTH, BACTERICIDAL FOR VARIOUS BACTERIA

Concentration CTAB in broth	Organisms killed after 18 hours at 37° C.
1 : 300 ..	*Proteus vulgaris* and *morgani*, *Bact. paratyphosum B*
1 : 900 ..	*Bact. coli* and *aerogenes*
1 : 2700 ..	*Bact. typhosum*
1 : 8100 ..	—
1 : 24,300 ..	*Bact. flexneri*
1 : 72,900 ..	*C. diphtheriæ mitis*, *B. subtilis*, *Cl. welchii*
1 : 218,700 ..	*Strep. pyogenes*, *Staph. aureus*, *S. lutea*, *Cl. œdematiens* and *septicum*, *Bact. shigæ*

against various organisms. On the basis of these few tests, for the most part with single strains, it appears that the intestinal gram-negative bacteria are relatively insusceptible, though the two dysentery bacilli are exceptions. The two pyogenic cocci, *Staph. aureus* and *Strep. pyogenes*, and the three classical gas-gangrene bacilli are all killed by low concentrations of CTAB. The related detergent cetyl pyridinium bromide was tested in the same way, in parallel with CTAB, upon these five organisms; its bactericidal and bacteriostatic titres were precisely those of the CTAB.

These relationships were borne out by a few tests made according to the technique of Baker et al. (1941) using saline or phosphate buffer instead of broth. For our purposes, the refinement of using washed cultures and working in buffer was not necessary. Our broth bacteriostatic mixtures retained their initial pH of 7·0, and the deviating effect of the broth on disinfectant action was negligible.

Effect of Organic Matter.—The effect of organic matter was measured by successive viable counts on disinfectant mixtures and by adding varying amounts of organic matter to the titration series described above. Garrod's (1935) killed yeast suspension (5% on basis of dry weight) made a 20–80 fold reduction of the bactericidal titres of CTAB for *Staph. aureus* and for *Cl. welchii*, from 25 to 80

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fold. Table II shows the effect of 5% yeast on 1/10,000 CTAB and *Staph. aureus*, and, incidentally, the rapid disinfectant action of CTAB-broth. Dead yeast cells have a marked affinity for CTAB; for example, a concentration of 1/5000 can be absorbed completely from a solution by 5% washed yeast cells. The fluid part of the yeast suspension, containing about 0·04% protein, has comparatively little effect. Ten per cent. horse serum produced a 9–27 fold drop in titre, tested on the two pyogenic cocci and the three gas-gangrene anaerobes.

For repeated applications of crude CTAB, the addition of emollient oils and aromatic essences may be desirable (see below). In view of the demonstration by Baker et al. (1941) that synthetic detergents like CTAB are inhibited by certain lipins, arachis oil and 'Bouquet' essence were both tested. Neither 4% arachis oil, nor 4% essence reduced the disinfectant power of 1% CTAB for the two pyogenic cocci and the three gas-gangrene bacilli. These oils, however, did not disperse readily in

TABLE II—EFFECT OF 5% YEAST-CELL SUSPENSION ON BACTERICIDAL POWER OF CTAB FOR *Staph. aureus*

CTAB (conc.) / Yeast (conc.)		1/10,000 / 0	1/10,000 / 5%
Viable counts of *Staph. aureus*	0 min.* ..	130,000	130,000
	8 min. ..	12	68,200
	16 min. ..	< 12	73,400
	4 hours ..	< 12	143,700

* Estimated from viable count of original inoculum.

the CTAB solution. A "vanishing" cream made of 10% arachis oil and 5% lanette wax in a 1/320 dilution inhibited 1/10,000 CTAB, but in a 1/10 dilution failed to inhibit 1/1000 CTAB. The dispersed oil and fat evidently deviate the CTAB to some extent. Nevertheless, 1% CTAB in the full cream had a considerable activity, for, applying the cup-plate technique of Rose and Miller (1939) the distance to which CTAB diffused into the agar medium from the "cup" full of cream was at least half that to which a plain solution of 1% CTAB diffused in similar circumstances. All the tests of cream were made with the two pyogenic cocci.

In summary, 1% CTAB is an effective disinfectant against pyogenic cocci and the gas-gangrene organisms, but variable in its action on coliforms. It is markedly affected by organic matter, especially dead cells.

PRELIMINARY CLEANSING OF INDUSTRIAL ACCIDENT WOUNDS

Wounds were cleansed with small gauze mops, moistened with either 1% CTAB or spirit soap, and the comparative efficiency of the two agents compared by estimating the ratio of the number of mops required to clean a standard area of each type of wound. Each mop was used for 12–15 rubs. A series of 150 lacerations, 12 abrasions and 29 burns, all seen within 4 hours of infliction, were cleaned with CTAB. These were variously contaminated, with road dirt and congealed blood, sump oil and press grease, grime (stoker's, collier's, sand-blaster's, caster's and founder's) or tar and pitch.

With sump oil or grease, CTAB is 6–7 times as efficient as spirit-soap; hard rubbing is rarely needed, except on the palmar skin surface, where a nailbrush may be necessary. Mixtures of road dirt and congealed blood are easily removed. CTAB readily removes grime, and is effective where spirit-soap altogether fails. Tar, the most persistent of all contaminants, is removed 4–5 times as efficiently by CTAB, though hard rubbing may be required if the tar is matted by hair. Where the skin around the wound is very dirty, a preliminary soak of 2–3 minutes in CTAB is essential. The preliminary soak is also essential for removing tar.

Dirt ingrained in abrasions can be removed with CTAB by hard rubbing alone; a nailbrush is unnecessary. Some type of anæsthesia or analgesia is required; the watery solution of CTAB is not painful, but the hard rubbing is. Of the 8 cases of abrasion so treated 5 healed within one week without sepsis. In the remaining 3, the abrasions were more extensive, and healing occurred in 2, 3 and 5 weeks respectively.

Second-degree burns were treated by the moist method (sulphanilamide powder and tullegras). CTAB was used to wash the whole area after removal of the blister. The results with bland after-dressings were satisfactory; on an average, the burns were healed and were covered with epithelium in 9–11 days, varying from 5 days for burns of the face, to 20 days for burns of the legs and feet.

BATHS AND SURGICAL INSTRUMENTS

We have confirmed the findings of Barnes (1942) that 1% CTAB cleans and sterilises baths and bowls that, after use by infected patients, are heavily contaminated with group A streptococci and *Staph. aureus*. In 14 bacteriologically controlled tests, the heavily contaminated grease-line was easily removed by CTAB and the resulting surface sterilised by another application. In 4 of the tests, CTAB was compared with neat lysol, and 10% hypochlorite solution. It was as efficient as the lysol, and about 10 times as efficient as the hypochlorite.

Surgical instruments may be similarly cleaned and sterilised. CTAB appears to be a safe emergency sterilising agent for smooth, non-absorbent surfaces. It must be emphasised, in view of the ease with which organic matter inhibits its bactericidal action, that CTAB must be first applied as a detergent, and all organic matter rinsed away if the final antiseptic application is to be effective. The CTAB may be wiped off with sterile towelling without rinsing. Application of *Staph. aureus* to the wiped surfaces of instruments so treated showed that a small but inhibitory concentration of CTAB remained on the metal.

DISINFECTION OF THE SKIN: GLOVELESS SURGERY

It appears from the skin sensitivity tests which we record below, and from a number of reports from persons who have been handling CTAB for long periods, that sensitivity to the repeated application of 1% CTAB is likely to declare itself after the first few applications, and that the percentage of skin-sensitive persons is small. We have therefore examined the disinfectant properties of CTAB in the light of its possible use by surgeons in gloveless operations.

The well-scrubbed hand, though no bacteria may be cultivable from its surface, is not sterile. Bacteria may be sweated from the deeper recesses of the skin (Devenish and Miles 1939, Gillespie et al. 1939, Vierthaler 1940). These bacteria are mainly saprophytes, but a small proportion of persons carry *Staph. aureus* in the deep recesses of the skin. Though in gloveless surgery there will be less sweating of the hands than there is inside a rubber glove, yet the temperature of the operating theatre may be high enough to induce a sweat that will wash the deeper bacteria out of the surgeon's skin. The known deep skin carrier of *Staph. aureus* should not engage in gloveless surgery unless measures other than gloving the hand are proved to render him safe. The carrier state may be detected by a test along the lines suggested by Gillespie et al. (1939). But with any organism the carrier state is notoriously intermittent, and it may be that those who show no evidence of carriage at the test will at other times sweat *Staph. aureus* from the deeper recesses of the skin. The ideal skin-cleansing agent should therefore (*a*) remove as far as possible the deeper-seated bacteria of the skin, including *Staph. aureus*; (*b*) kill those it cannot shift, and (*c*) persist on the skin so as to provide an antiseptic defence against bacteria that later emerge from the inaccessible depths of the skin. We have tested CTAB in these respects in the following ways.

Removal of Deep-seated Bacteria.—Volunteers scrubbed-up one hand for 5 minutes with soap and warm water, rinsed it well, and applied 70% industrial spirit to dry it. An area of about 2 sq. in. of skin was sampled bacteriologically with a broth-wetted swab, and a sterile rubber glove put on. The other hand, which in the meantime had been protected by a rubber glove, was now scrubbed up with 1% CTAB for 5 minutes. After thorough rinsing to remove all the CTAB, the hand was dried on a sterile towel, sampled as above for bacteria, and covered with a sterile rubber glove. The volunteer was kept in a hot room until general sweating was evident, the interior of the gloves rinsed with a little broth, and press-plates (Devenish and Miles 1939) made of the palmar aspect of each glove.

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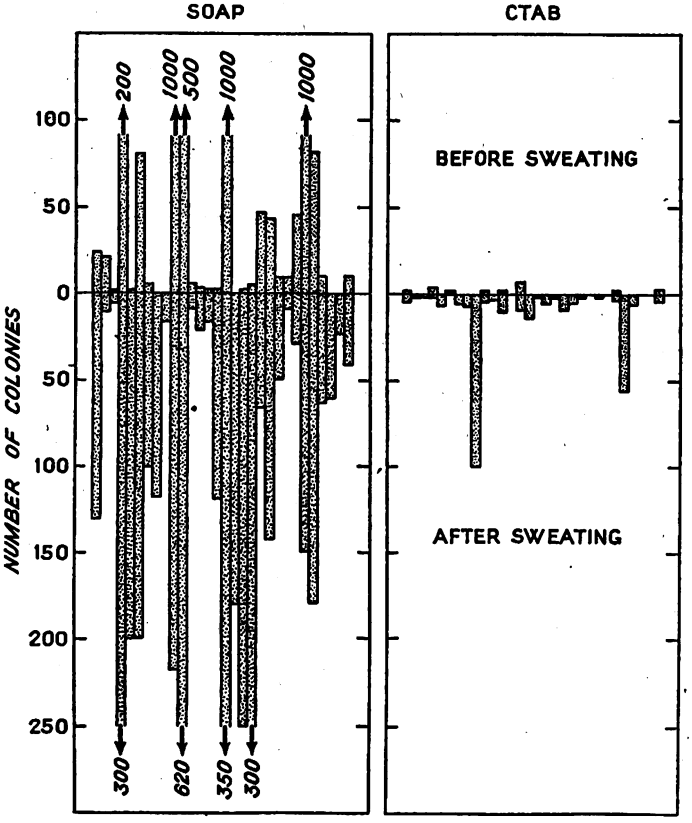
The results of tests on 30 volunteers are recorded in the figure. The after-sweat sampling by press-plates is not so thorough as the pre-sweating swab, so that the number of colonies recorded above and below the line are not strictly comparable. Nevertheless, it is obvious that CTAB is much more efficient than the soap, and that far fewer bacteria are left in the deeper layers of the skin. The gross incapacity of soap and water to clean the hand may in certain cases have been due to poor scrubbing-up (some of the volunteers were laymen); but in other cases the volunteers were well-trained hospital nurses, and the results cast a doubt on the efficacy of this standard method. But in all cases the scrubbing of the other hand by CTAB would be equally thorough, so that comparisons of the two methods are valid.

It is noteworthy that 4 of the 30 volunteers sweated *Staph. aureus* from the deeper recesses in the skin, 2 of them in the CTAB-cleaned, and 2 in the soap-cleaned hand. The incidence is high compared with the 5% found in normal skins both by Gillespie et al. (1939) and Vierthaler (1941). The results confirm the value of CTAB as a skin steriliser found by Barnes (1942) and by Dr. Margaret MacKay (personal communication) who, in a test of many skin antiseptics, found that only 1/1250 phenyl mercuric nitrate and 1/100 CTAB could be relied upon to produce an apparent sterility of unwashed skin.

Persistence of CTAB *on the Skin.*—CTAB persists in bacteriostatic concentrations on the dry skin for several hours. Its presence was detected by applying to the dry, treated skin pastilles of nutrient agar, 1 cm. in diameter and 2 mm. thick, cut from pour-plates in which varying numbers of viable *Staph. aureus* had been incorporated. After 5 minutes' application the pastille was removed and incubated to determine the number of staphylococci that survived, as compared with control pastilles placed on soap-washed skin. The test is severe, for the moist surface of the agar has in 5 minutes to absorb enough CTAB to sterilise the whole pastille. Thirty tests on 8 persons showed that the greatest bacteriostatic concentrations of CTAB on the skin were produced by cleansing the skin with 1% CTAB, rinsing, and allowing a fresh application to dry on. For at least 4 hours after this treatment enough CTAB remained to sterilise pastilles containing 200,000 *Staph. aureus*; some CTAB remained after 24 hours. If the final application of CTAB was wiped off with a sterile towel, the bacteriostatic powers of the skin were less evident after 4 hours, though pastilles containing 20,000 *Staph. aureus* were usually sterilised. Provided that the film of CTAB is not washed away, the concentration left on the skin after a 1% solution has dried on appears to be strong enough to kill small numbers of *Staph. aureus* that might be sweated from the deeper recesses of the skin during operative procedures. Thus CTAB provides a relatively lasting "antiseptic barrier" on the skin, comparable with that produced by applications of iodine and chloroxylenol solutions (Colebrook and Maxted 1933, Colebrook 1941).

RESULTS OF TESTS ON THE HANDS OF 30 VOLUNTEERS



THE SENSITIVITY OF SKIN TO CTAB

Repeated Applications.—Tests were made on 42 young adult volunteers, of whom two-thirds were female. A thrice-daily application of 1% crude CTAB in water was aimed at. This was not always achieved, particularly during the weekends; and the average number of applications per day in all groups was 2·6 per person. CTAB was applied by 5 volunteers for two weeks, by 18 for three weeks and by 18 for four weeks. The solution was rubbed well into the hands for 2–3 minutes. Five volunteers in the second group rinsed off the CTAB after each application; the remaining 37 volunteers allowed the fluid to dry on their hands.

In the first group there were no ill effects; in the second group 2 persons suffered from chapped hands some 5–10 days *after* the last application of CTAB; this chapping cleared up rapidly with ordinary emollient cream. In the third group, 2 persons had slightly chapped hands in the second week of application, but this cleared up rapidly, although the applications continued for 18 more days. The 42nd person complained of marked chapping of the hands after one day's application of CTAB, and did not continue with the test.

In general, most of the volunteers found that CTAB made their skins softer and smoother. Some, however, complained of unwonted dryness of the hands. Our general impressions from these limited observations, and from our experience with CTAB in laboratories and hospitals, is that if a person is sensitive, the sensitivity will declare itself after a very few applications, and that other persons may use CTAB with safety for repeated applications.

Patch Tests.—Further tests of natural skin sensitivity to CTAB were made on 144 young adult volunteers. About 0·05 c.cm. of a 1% alcoholic solution of CTAB was allowed to dry over an area 4 mm. in diameter on adhesive plaster. The plaster was applied firmly to the skin of the upper arm or thigh, and reactions noted after 1 and 2 days. Positive reactions consisted of an area of erythema, sometimes with papular swellings, coincident with area of dry CTAB on the plaster. Parallel tests of cetyl pyridinium bromide (CPB) were made. Table III shows the results of the 144 volunteers. One person was sensitive to plaster so that no reading could be made; 5 reacted definitely to CTAB, and 12 doubtfully; none reacted definitely to CPB. The positive reaction does not necessarily indicate a ready sensitivity to a cleansing application or even repeated applications of a 1% aqueous solution. The skin of the volunteers was in contact with a thin film of solid CTAB, representing a much higher concentration than 1%. However, there is no statistically significant difference between the percentage of sensitive persons, 2·8, derived from this test and 2·4 from the repeated-application test in 42 volunteers. A better estimate of the proportion of sensitive persons in the population must await more extensive use of the compound. A comparison of the CTAB and CPB results suggests that the irritating power of CTAB resides in the trimethyl ammonium residue.

Attempted sensitisation of the human subject.—Of the students negative to the patch test 39 were chosen at random, and 19 applied CTAB to their hands three times daily for 12 days. The whole group was then patch-tested again. None of the students was positive, showing that neither the original patch test (in the control group) nor the repeated application of the solution had in that time induced a sensitivity to CTAB. The possible later development of sensitivity is under investigation.

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TABLE III—SKIN REACTIONS OF 143 HUMAN VOLUNTEERS TO PATCH TESTS WITH CTAB AND CPB

	Reaction to	
	CTAB	CPB
Nil	127	142
Doubtful ..	12	1
Positive ..	4	0

CONCLUSIONS

None of the investigations of CTAB that we have reported is extensive; our object in publication at this stage of our work is to advertise the possible advantages and drawbacks of CTAB as an aid to surgery, so that others may be induced to investigate them.

CTAB kills bacteria, but its action is so limited in the presence of organic matter that it should not be considered primarily as an antiseptic. It is, however, an excellent detergent, and a surface cleaned of gross organic matter by CTAB may be easily sterilised by a final application of the compound. It is a useful rapid emergency disinfectant of instruments and utensils; as a detergent for dirty wounds and skin around wounds its advantages heavily outweigh the minor disadvantage of a possible reaction in a sensitive person. On greasy or tarry industrial wounds it is more effective than trilene, and far more antiseptic. For cleaning baths of infected grease, 1% CTAB is as effective as neat lysol, and much safer for the user.

The cleansing and antiseptic powers of 1% CTAB on the skin are far greater than those of soap and water, and in this respect it is an admirable fluid for repeated use on the hands of surgeons and nurses. Its power to remove bacteria in the deeper recesses of the skin and its persistence on the dry skin are points in favour of its employment in gloveless surgery. A moderate "scrub-up" with CTAB, followed by drying with a sterile towel, will ensure a high degree of bacterial cleanliness, which could be maintained easily, even during a wet operation, by an occasional rinse of the hands in CTAB.

But with repeated application, mild degrees of toxicity for tissues may exert a cumulative effect; naturally sensitive persons may become more sensitive, and react severely; and the continued removal of the natural lipins of the skin, apart from sensitivity, may prejudice the health and the natural antibacterial powers of the skin. The weight that must be attached to these adverse considerations is to a large extent unknown, but the possibilities must not be overlooked. We have as yet few data on the increase of sensitivity with repeated application. Colebrook (1943) reports 3 instances of troublesome dermatitis in over 1100 patients treated for burns. In one of the three cases there were only two applications of CTAB; dermatitis followed about a week after the second, and the skin was sensitive six weeks later. The two remaining patients were exposed continuously to a cream containing CTAB for several days; both reacted strongly in sensitivity tests. It is possible that sensitisation is more readily acquired through damaged skin than through unbroken skin. Lovelock, J. E., and van den Ende, M. (personal communication) report a few preliminary experiments on guineapigs in which repeated application of CTAB to skin round burns not only resulted in increasingly severe dermatitis, but, if the applications were withheld for a period of 7–12 days, resulted after further applications in an even greater reaction. In these circumstances CTAB appeared to have a cumulative and a sensitising effect. Miles (1943) found that 20–30% CTAB applied daily to the backs of mice for 30–60 days produced large inflammatory areas in which the superficial layers of the dermis were wholly destroyed. These considerations, especially in view of the successful use of CTAB by human subjects, are not necessarily contra-indications for its use; for many commonly used antiseptics are toxic in high concentration or after repeated applications; but the possibility of untoward effects must be borne in mind.

The removal of natural oils and fats from the skin might be countered by the use of emollient oils, like arachis oil, either in CTAB or applied after it. However, the renewal of oily matter as such may not be sufficient, for Burtenshaw (1942) found that the streptococcicidal power of the human skin surface depended on its content of unsaturated fatty acids, and the continued removal of these natural fats might reduce resistance of the skin to infection. In 14 subjects we have compared the effect of scrubbing-up the palms of the hand with water, soap and warm water and with 1% CTAB, on the ease with which the streptococcicidal fats can be extracted with ether by Burtenshaw's technique. In some cases there was a slight increase, in others a slight decrease in the power of the extracts to kill *Str. pyogenes*, but the changes were no greater than those observed in extracts of the normal skin of single individuals tested at different times, and much smaller than variations observed from person to person. CTAB does not therefore appear to have a significant effect on the readiness with which the fats can be extracted from the skin.

SUMMARY

One per cent. CTAB is an excellent agent for cleansing surfaces of organic matter, and has considerable antiseptic powers on already clean surfaces. It is recommended for both the cleaning and sterilisation of utensils and instruments; and for the cleaning of wounds and the skin surrounding wounds.

It is also highly effective for removing dirt and bacteria from the hands of the surgeon and nurse, and far more effective than scrubbing with soap and water. In this respect it appears to be an admirable substance to apply to the hands of surgeons and nurses in gloveless surgery. There are, however, certain drawbacks, notably skin reactions in a small percentage of sensitive persons, whose importance can best be determined by extensive trial in surgical practice. The chemically related detergent, cetyl pyridinium bromide, is less likely to induce highly sensitive reactions.

We are indebted to Dr. Charles Scott of the biological department, Imperial Chemical (Pharmaceuticals) Ltd. for our supply of CTAB; to Dr. H Davis for pharmaceutical advice and help; to many volunteers in the Birmingham Accident Hospital and among students of Birmingham University and of University College Hospital medical school for their coöperation; and to our surgical colleagues for their collaboration. One of us (E. M. M.) is in receipt of a grant from the Medical Research Council.

Note.—Throughout the paper the recorded concentrations of CTAB refer to those of the crude product actually employed, which contains 79% of cetyl trimethyl ammonium bromide (Dr. Scott; personal communication). These concentrations, to express them in terms of pure substance, should therefore be multiplied by the factor 0·79. Thus in table I, the concentrations would be 1:380, 1:1140, 1:3420, &c., and in table II, 1:10,000 CTAB is equivalent in 1:12,750 of the pure substance.

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Two amendments to the NHI schedules make available as part of medical benefit hypodermic needles and syringes for the self-administration of adrenaline, and add oiled artificial silk to the list of "protectives."

GLAXO LABORATORIES are introducing a new crude liver extract, 'Plexan,' which retains the less well-defined constituents of liver thought to be important in the treatment of certain forms of macrocytic anæmia, though protein and histamine-like substances likely to cause reactions have been removed. This is not intended to replace the refined extracts for straightforward cases of pernicious anæmia.

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A CASE OF MATRICIDE

DENIS HILL, M B LOND, M R C P, D P M
WILLIAM SARGANT, M B CAMB, M R C P, D P M

With the assistance of

MOLLIE E. HEPPENSTALL,* PH D, B SC LOND

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(Maudsley Hospital, LCC)

AT the Old Bailey recently, a young man accused of the murder of his mother was found guilty but insane. The authors of the following note gave evidence in his defence, and in view of certain interesting features in the case have decided to publish their findings.

The accused, who was 20 years of age and lived alone in a flat with his mother, killed her by stabbing with a kitchen knife, at 11.40 PM on Dec. 30. Multiple wounds were inflicted. Sir Bernard Spilsbury stated at the trial that death was due to hæmorrhage into a pleural cavity, and grazes on her chest wall suggested that many additional stabs had been attempted. The accused in subsequent statements described in detail the quarrel and the death of his mother. Five days before the murder his mother had opened a club for Service men and he had assisted her energetically. His meals had been irregular; every day he had gone without a formal breakfast and he had been forced to snatch his meals when he could. Recently there had been some quarrelling between the accused and his mother over finance. On the morning of Dec. 30 he had suddenly lost his temper and struck her, a very unusual thing, for which he had subsequently apologised. On that day he had eaten very poorly, his last carbohydrate meal being at noon. In the evening he ate two small chops. Between 9 and 10.30 PM he had drunk four pints of mild ale and had then returned home to go to bed. On his mother's return at 11 PM a quarrel developed over money. During this the accused was pushed out of his mother's room, along a passage into his own room, when, despite the four pints of beer, he suddenly felt thirsty and went to the kitchen to fetch an opener for a lemonade bottle. There he saw a kitchen knife, and at this point, he said, "something came over" him—"I was like a homicidal maniac." He attacked his mother with a knife and killed her. He then realised what he had done, wiped the knife for fingerprints, washed and dressed, and left the house. For seven hours after this he developed amnesia. The next day he gave himself up to the police and made a full statement.

Dr. Leo Rau, who had examined the accused in 1941 at the request of his mother, suggested to the defence that an investigation of the carbohydrate metabolism and of the EEG be made. In 1941 a sugar-tolerance curve had shown a tendency to hypoglycæmia (56 mg. per 100 c.cm. after three hours). Dr. Rau also knew that a paternal uncle had suffered from epilepsy and a maternal aunt from schizophrenia. He had investigated also the severe bilateral nerve deafness and had formed the view, with which we have concurred, that the accused had an abnormal personality.

GENERAL EXAMINATION

The accused was pale, of asthenic physique and poor nutrition, weighing 114 lb. During the six weeks in Brixton Prison before his trial he gained 5 lb. He had severe bilateral nerve deafness but could hear when spoken to loudly. His gait was clumsy and there was an equivocal plantar response on the left side. It was stated that until the age of 9 his movements were very ill-coördinated and he often stumbled and fell. His secondary sex characters were normally developed and there was no gross evidence of endocrine disorder.

His history showed that he had always been very nervous and apprehensive, not particularly aggressive, and had failed to adapt himself to ordinary life, having become dependent on his mother. He had been generally unstable and unreliable, though there was no evidence of dishonesty. Emotional immaturity was the most striking quality in his personality. His intelligence was normal. He showed little self-reproach about the murder and very little real emotion when describing the details.

SPECIAL TESTS

The following biochemical and electrical tests were made during a period of four days. In all, 81 blood-sugar estimations and over 30 EEG records were made.

1. Insulin-resistance curve.
2. Colorimetric estimation of 17-ketosteroids in 24-hour specimen of urine.
3. Sugar-tolerance curve.
4. EEG with high, fasting and normal blood-sugar levels.
5. EEG during artificial lowering of blood-sugar level with insulin and observations on mental state during this test (three occasions).
6. Investigation of blood-sugar levels after four pints of mild beer, and reactions of the EEG. Observation of mental state after this alcohol.
7. Some tests on impairment of consciousness associated with the abnormal electrical potentials that appeared in the EEG during periods of voluntary deep breathing with low and high blood-sugar levels.

1 and 2. *Insulin resistance and 17-ketosteroids.*—A normal insulin-resistance curve and 17-ketosteroids assay (12·6 mg.) (Fraser, Maclay and Mann 1938, Fraser and Smith 1941) eliminated pan-hypopituitarism and pancreatic hyperinsulinism.

3. *Sugar tolerance.*—In 1941, a fasting level of 78 mg. per 100 c.cm. rose to 135 mg. after 30 g. of glucose and fell to 56 mg. after three hours. In our test, done after some weeks on Brixton Prison diet, a fasting level of 83 mg. rose to 147 mg. in half an hour after 50 g. of glucose, and fell to 72 mg. within two hours, remaining at 78 mg. for four hours.

4. *EEG at various blood-sugar levels.*—With blood-sugars above 100 mg. per 100 c.cm.—namely, 113 mg. and 159 mg.—the EEG showed very little abnormality, either at rest or after hyperventilation. Many EEGs were taken with the blood-sugar below 100 mg. At all such levels the EEG was abnormal. These abnormalities consisted of (*a*) well-marked asymmetry in voltage, regularity and frequency of the rhythms on the two hemispheres; (*b*) a 4–6 cycle abnormal rhythm, with a voltage equal to the dominant occurring paroxysmally from the right frontal lobe; (*c*) pathological instability on hyperventilation, which elicited a 3-cycle high voltage discharge.

5. *Observations with lowered blood sugar.*—The EEG was examined after the intravenous injection of 50 units of insulin, and was subsequently checked after 25 and 5 units. The blood-sugar was correlated with the EEG and mental changes which occurred. At 86 mg. per 100 c.cm. the dominant frequency had fallen from 9 to 7, and progressively fell until at 45 mg. three 3-cycle rhythms made up the greater part of the record. At 88 mg. the pathological instability could be elicited by two minutes' hyperventilation; at 44 mg. the phenomenon occurred after one minute. At levels between 56 mg. and 44 mg. he had feelings as if he had taken "considerable quantities of alcoholic liquid," and at the low level he complained of great thirst.

6. *Observations after ale.*—The accused was given four pints of mild ale to drink in an hour, and the blood-sugar and EEB were followed during and after this, the object being to discover whether the malt sugar in the beer which he had drunk on the night of the murder would have been sufficient to inhabit the abnormal hyperventilation response. While the beer was being drunk the blood-sugar rose from 97 mg. per 100 c.cm. to 127 mg. but fell to 104 mg. an hour after he had finished, and was 97 mg. an hour later. Fifteen minutes after he had finished the beer, the abnormal hyperventilation response was inhibited by the temporary rise in blood-sugar, but at one hour and thereafter it could be easily elicited and progressively more readily as the blood-sugar fell. He showed no signs or symptoms of clinical intoxication.

7. *Tests on impairment of consciousness.*—During a period of hyperventilation with a high blood-sugar, when no instability in the rhythms could be produced, the accused remembered phrases shouted in his ear. With a similar test with a low blood-sugar, when high voltage 3-cycle rhythms were appearing in his record, he did not remember similar phrases, though he obeyed commands at the time. Subsequently, he said that he had been conscious of everything that happened, though it was obvious that he had not, and that both judgment and consciousness were impaired at the time when the abnormal waves were present.

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CONCLUSIONS

From the history and examination we concluded that the accused had an abnormal personality, associated with which was a poor physique, severe inner-ear deafness, a possible birth injury to the right hemisphere, and psychopathic inheritance. He was not suffering from clinical epilepsy or from acquired mental disease, but whenever his blood-sugar was below about 100 mg. per 100 c.cm. the EEG was abnormal, and hyperventilation would induce an abnormal electrical discharge in the cortex, which was associated with a degree of impairment of judgment and some clouding of consciousness. In our opinion, from the history of his diet before the murder and the glucose-tolerance tests, it was practically certain that his blood-sugar was below 100 mg. per 100 c.cm. at the time when he murdered his mother, and that hyperventilation occurred owing to the emotion aroused by the quarrel and particularly by his being pushed struggling along a corridor. Since the murder took place over an hour after finishing the beer, the malt sugar would not have inhibited the phenomenon.

Taking all the evidence into consideration, we concluded that from the legal point of view the accused knew what he was doing at the time when he killed his mother and knew that what he was doing was wrong, but we were of the opinion that his brain was functioning abnormally at the time, the abnormality being such as to impair his judgment and render him unable fully to appreciate the nature of the act. The judge explained the McNaghten rules to the jury and pointed out that all the medical evidence had shown that according to law the accused was guilty. After 100 minutes the jury returned a verdict of "Guilty but Insane."

DISCUSSION

Though it is generally recognised that hyperglycæmia will tend to suppress epileptic activity in the EEG, the degree of instability to hypoglycæmia seen in this case has not been previously recorded. In our own experience the normal EEG does not show a detectable slowing of dominant frequency at sugar levels above 50 mg. per 100 c.cm., and this is also the view of F. A. Gibbs (1942). In this case, a well-marked change occurred between 80 and 90 mg. per 100 c.cm. The incidence of abnormal EEGs among individuals of abnormal personality who commit acts of violence is known to be high (Hill and Watterson 1942) and also among psychopathic persons generally (Harty, Gibbs and Gibbs 1942). There can be no doubt, however, that the aggregate of abnormality on the psychological, neurological and metabolic levels of function, together with the unfortunate dietary insufficiency, make the present story a rare and possibly unique one. But it indicates that the impulsive and apparently motiveless crime of violence is a problem for study by all the methods now available to psychiatry. By such methods tests can be designed to be of such an objective nature that they were readily verifiable by any one concerned, and thus expressions of clinical opinion based on impressions without the support of objective data can be avoided.

We came to the conclusion, after four days' investigation, that at the time the accused killed his mother he was not responsible in a psychiatric sense for his action. For, to be responsible, in our opinion, a person must be in full possession of his consciousness and so be able to pass judgment on and control his actions. The final evidence that this was not the case was startlingly revealed in court. A witness for the prosecution who lived in the flat below recorded that she had heard screams at 11.40 PM. The accused, who had twice given a completely factual and detailed account of his memory of the murder, had not mentioned this, yet he had described exactly the initial stage of the assault and the position of his mother on the floor after she had fallen. There was, in fact, in the accused's story the suggestion of a march of events, a progressively increasing hypoglycæmia. There was first the poor diet for a week, then the unusual irritability in the argument on the morning of the 30th, then the further poor diet for that day, leading up to the assault on and death of his mother in the night, and *followed* by 6–7 hours' amnesia.

Since the McNaghten rules make no allowance for degrees of consciousness and responsibility, it was obvious that the accused's case could not be argued within their framework, and we made no attempt to do so. We therefore stated in court the results of our investigations and the simple medical conclusions that could be drawn from them.

We wish to thank Mr. J. Theobalds, electroencephalographic technical assistant, and Mr. R. Slater, pathological laboratory assistant, for their help in these investigations.

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ANÆSTHETIC EXPLOSION DUE TO STATIC ELECTRICITY

ELVA M. CHIVERS, M B CAPE TOWN, D A
ANÆSTHETIST TO THE WEST MIDDLESEX COUNTY HOSPITAL

AT about 11 AM on July 10, 1942, an anæsthetic explosion occurred in the gynæcological theatre of the West Middlesex County Hospital. The anæsthetic apparatus in use at the time was a Boyle's machine consisting of a table with nitrous-oxide, oxygen and carbon-dioxide cylinders attached, a dry flowmeter, chloroform and ether bottles, and a Magill unit. No CO_2-absorber was attached to this machine.

One operation had been performed under a general anæsthetic, and the second patient, a middle-aged woman, was about to undergo a minor gynæcological operation. After a quiet induction lasting about five minutes, during which she was given N_2O–O_2 ether mixture, she was wheeled into the theatre together with the Boyle's machine; the face mask was kept on the whole time. She was then lifted on to the operating table, and the stretcher trolley was wheeled out of the theatre. After about two minutes, during which the anæsthetic mixture had not been changed, and without the slightest indication of anything being wrong, there was a sudden deafening report, and the anæsthetic table was enveloped in a sheet of white flame.

The mask was immediately removed from the patient's face, the oxygen cylinders turned off and removed from the theatre, and the fire extinguished. Nothing further occurred, the whole explosion being over in about two seconds. The patient sustained a slight injury to one eyelid, caused by flying glass; the anæsthetist had several small cuts, a black eye and was deafened. No-one else was injured.

There was no electrical apparatus or open flame of any kind in the theatre, and the anæsthetic machine was earthed by a chain.

After the explosion the remains of the Boyle's machine were carefully examined. The oxygen and nitrous oxide reducing valves were found to be in perfect condition and quite free from oil. The chloroform and ether bottles, as well as the thick plate glass top of the table were completely shattered, the rebreathing bag was destroyed, and spare masks and airways were burnt. The face-piece that had been used was intact, the expiratory valve half open, and the respiratory hose of the Magill unit was intact to within 2 in. of its attachment to the machine. At this spot it had obviously burst, and it was concluded that the initial explosion had occurred there, and passed backwards into the machine.

In view of the absence of electrical apparatus or open flame in the theatre, the most likely explanation of the explosion seemed to be that a static charge had developed in the respiratory hose, at the spot where the tube had burst, caused by the friction of the dry gases over the dry rubber, and as a highly explosive anæsthetic mixture was being used the static spark ignited the gases.

In his book *Inhalation Anesthesia* A. E. Guedel points out that a static charge may be developed anywhere within the apparatus by the friction of two bodies or substances against each other, but the commonest cause is the friction of the dry gases flowing through the apparatus and respiratory hose. He also points out that with complete rebreathing the humidity in the apparatus becomes so high that a static spark is impossible. In this instance there was no CO_2-absorber in use, so complete rebreathing did not take place.

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Reviews of Books

Thorpe's Dictionary of Applied Chemistry

(4th ed.) Vol. V: FEH–Glass. The late Sir JOCELYN THORPE; M. A. WHITELEY, DSc, FIC. (Longmans. Pp. 610. 70*s*.)

A CLASSIC should have outward distinction to match its intrinsic worth and this edition of "Thorpe" is bound in 'Monastic Fast Blue, BS,' a pigment that came as a bolt from the azure to the dyestuffs industry in 1936, just in time to herald the modern trend of applied chemistry. For the previous editions, guided by Sir Edward Thorpe (who died in 1925), were limited rather strictly to the applications of chemistry to the arts and manufactures, whereas from the first his successor, Sir Jocelyn Thorpe, also an FRS, realised that technology could not be divorced from pure science, even in the compilation of a dictionary. And since Sir Jocelyn's death two years ago his co-editor, Dr. Martha Whiteley, has continued to implement the wider scope which provides a general work of reference for all concerned with chemistry or chemical industry—with special attention from now on to the developments of physical chemistry. The new editorial board comprises Prof. I. M. Heilbron (Imperial College, SK), chairman; Dr. H. J. Emelius (Imperial College), Prof. H. W. Melville (Aberdeen) and Prof. A. R. Todd (Manchester); Dr. A. J. E. Welch becomes assistant editor and the current edition is to be completed with 8 further volumes, appearing if possible at yearly intervals. The volume before us, like its predecessors, can enthrall the casual reader. The longest articles are on technological subjects—fuel, coal-gas, glass—but of particular interest to the biological reader is the series on fermentation. The 32-page monograph on alcoholic fermentation by the late Sir Arthur Harden deals also with fermentation in muscle; and a wide field is covered in articles on bacterial fermentation by Dr. Marjory Stephenson and mould fermentation by Dr. J. H. Birkinshaw. There is a mine of knowledge on food preservation and preservatives, on fertilisers and manures, and on gelatin. Another series covers animal, vegetable and artificial fibres, and readers will find in the story of rayon an austere fascination. The terse and accurate writing cannot disguise the sheer romance of industry, which is continually breaking through, whether in the history of the commonplace gas-mantle, or of the glassblower's practised art.

Cytology, Genetics and Evolution

By twelve authors. (Oxford University Press. Pp. 168. 12*s*.)

THIS symposium is a reprint of papers read at the bicentennial conference of the University of Pennsylvania by twelve eminent American biologists. Demerec's fascinating paper on the nature of the gene shows how far cytology and genetics in combination have progressed in tracking down the gene to its individual lair. It is principally the giant salivary chromosomes of the diptera which have made these minute studies possible. When rearrangements are induced by X rays, it has been shown how close a break must be to some of the loci in order to affect the operation of the gene; and how when a gene is transplanted in this way it is affected by the neighbouring portions of chromosome in its new situation. It has also been shown that the locus of some genes can be identified with a length of chromosome comparable with the size of a molecule of thymonucleic acid. The speculation is advanced that the genes, known to be concentrated at the darkly staining bands visible in the salivary chromosome, correspond to discs one molecule thick. Another contribution, that of Duryee, on the chromosomes of the amphibian nucleus, shows how such genes may operate by manufacturing substances essential for growth and development. Dobzhansky links up chromosome studies with evolution, for he shows that in various species and races of drosophila many inversions of chromosome segments have taken place in the past and that the relative frequencies of these inversions not only show definite geographical relationships, but that inversions have played a large part in the evolution of species. The differences found between species are also found within them and the cytogenetic studies confirm the evolutionary view that under certain conditions races become incipient species. Jennings, Diller and Sonneborn deal with the cytology and genetics of the protozoa; Henshaw with radiation and the cell nucleus.

Aviation Medicine

ERNST JOKL, MD, consultant in physical training to DGMS, South African Defence Force. (Unie-Volkspers Beperk. Pp. 213. 10*s*. 6*d*.)

UNLIKE its predecessors on this subject by Bauer (1926) and Armstrong (1939) this book does not live up to its title. Dr. Jokl's subject, upon which he has written in Germany and South Africa, is physical education; he also flies and is therefore interested in aviation, but in setting out to write a comprehensive survey of recent advances in aviation medicine he has had to rely upon books published before the war and the few articles which have appeared since. These sources are inadequate, since in countries at war only the less important and self-evident material relating to aviation is released for publication. The matter included has been selected somewhat uncritically and medical officers in the Air Forces will find little new to them. The more entertaining parts of the book—those dealing with history of aviation and with parachute descents—are not concerned with medicine, and the chapter on choosing pilots contains nothing constructive about selection, which has now a huge literature of its own. The pictures are well chosen and amusing and the copious references range from the *Psalms* to the *Saturday Evening Post*.

Modern Psychology

CHARLES S. MYERS; FRANK M. FREEMAN; MORRIS S. VITELES. (Oxford University Press. Pp. 48. 3*s*. 6*d*.)

IN the first of these three pleasantly written addresses Dr. Myers gives a brief, mildly critical conspectus of the various schools that have arisen in psychology since Wundt. The second is by Frank Freeman, a Californian educationist, who examines the psychological problems of mental development in childhood and youth, as they affect education; learning and individual differences receive special attention. Professor Viteles summarises some of the advances made by industrial psychology during the last ten years, showing that scientific objectivity has prevailed in the collection and interpretation of data about factors influencing human adjustment in industry.

First Aid in Civil Defence

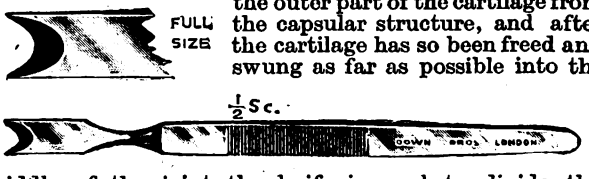
R. G. WINDER, staff officer, Brighton casualty service. (Fountain Press, London. Pp. 63. 1*s*. 3*d*.)

THIS booklet is yet another attempt to bridge the gap between classical first-aid teaching and the needs of the blitz casualty service. The importance of saving the greatest possible number of lives in a raid and the judgment needed in treatment are emphasised, and the treatment advised is sound. The book should be used in addition to a standard training manual rather than as a substitute for it, and so the anatomical chapters might have been omitted and the space given to more of the practical details indicated by experience. It is a compact and sound little guide to the first-aid methods practicable under the conditions of civil defence.

New Inventions

MENISCOTOMY KNIFE

THE meniscotomy knife, here illustrated, has been planned with a twofold object. It is used to separate the outer part of the cartilage from the capsular structure, and after the cartilage has so been freed and swung as far as possible into the



middle of the joint the knife is used to divide the posterior attachment. It has been made as small as is consistent with strength.

The makers are Messrs. Down Bros., London.

ALEXANDER MITCHELL, ChM Aberd.

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THE LANCET

LONDON: SATURDAY, APRIL 24, 1943

ACCIDENT SERVICES

YEAR by year the web of preventive and curative services gets woven more closely. The idea that accident cases need treatment in special centres, at the hands of specially trained staff, has been gaining ground steadily since the last war, and in some countries competent and well-equipped centres have been established, though as yet no complete service has been founded anywhere. In a country as closely populated, as car-ridden (in the ordinary way) and as heavily industrialised as ours there are good reasons for such a service. The British Orthopædic Association has been looking to the future of accident services and at a special meeting, held in London on Feb. 27, approved a report[1] which is circulating as an 8-page memo.[2] This authoritative brochure (of which a summary appears on a later page) begins by recalling the memo published in 1935 by the British Medical Association on fracture services, and the proposals in 1939 of the interdepartmental committee on rehabilitation of persons injured by accidents. It is noteworthy that since that time opinion has veered towards a comprehensive traumatic service rather than a fracture service only. True the interdepartmental committee suggested that the fracture service should deal with such allied conditions as severe lacerations and sprains, and injuries of the hand and fingers; but they held that it should exclude injuries to the head and abdomen. The BOA agrees that such injuries should be treated by surgeons expert in the regions concerned, but considers that this should be achieved by team work within the accident service.

The four cardinal principles laid down by the BMA in 1935 still hold. These are: segregation of cases in a single department; continuity of treatment from the time of injury until recovery of working capacity as complete as can be achieved; unity of control; and aftercare. The BOA recognises that segregation should not be carried to the lengths of providing separate accident hospitals. Only in the general hospital with its full complement of physicians, surgeons, radiologists, bacteriologists, ophthalmic and dental surgeons and others can the treatment of all injuries—whatever their site—be undertaken by experts. The end to be achieved is that of fitting the patient to do his old job, or—if that is impossible—to do some new job within his capacity. These two aspects of rehabilitation are given full weight. For minor injuries in those who were doing sedentary or light industrial work the hospital itself should be able to provide adequate care; for more seriously injured patients accustomed to heavy work residence in a country rehabilitation centre will probably be needed. The results already achieved among injured soldiers in such special centres set a standard for those treating the casualties of peace-time.

So far most surgeons will probably be in substantial agreement with the views of the BOA; but the memo is on more controversial ground when it asserts that the service "must be developed by surgeons who have been trained and qualified in every branch of the subject, are widely experienced in the deformities and diseases of the locomotor system, and are specifically trained in the problems of trauma"—for where are these paragons to be found? Among the orthopædists, says the BOA. While it cannot be denied that orthopædic surgeons have a sound basic training for the directorship of an accident unit, it cannot be assumed that a general surgeon could not equally well qualify himself for the task. Both would have to enlarge their knowledge in order to be suitable. The orthopædist—as indeed the memo points out—would have to study problems related to trauma, and the general surgeon the special features of surgery of motor system. The BOA is opposed to the development of specialists in "traumatic surgery"; and we agree that the trend of specialism is towards regions of the body rather than towards particular pathological processes. Nevertheless it must be admitted that accident surgery is essentially emergency work and is bound to disrupt any other surgical routine. The wide field of limb surgery will almost certainly absorb the full attention and capacity of those undertaking it; thus treatment of burns of the hands may take up the time which the orthopædist would normally devote to scoliosis while the general surgeon in an accident service will be likely to find his days occupied with intricate details of splintage, plasterwork and physiotherapy. In learning and practising these techniques the accident surgeon, whatever his origins, will become the specially prepared surgeon of the memo, and perhaps in spite of himself a specialist in traumatic surgery. The memo has been circulated at the right time, and should help to reveal a basis of agreement. It is our fate and our fortune that we do not progress without discussion.

1. See *Lancet*, March 27, p. 410.
2. British Orthopædic Association: Memorandum on accident services. Obtainable from the hon. secretary of the Association, Wingfield-Morris Orthopædic Hospital, Headington, Oxford.

THE SAFE PERIOD

DURING part of the menstrual cycle conception is extremely unlikely, and by confining intercourse to this "safe period" contraception can be practised without chemical or mechanical aids. But is it possible to define a safe period of reasonable length, or to give advice that will cover individual variations in the cycle? We know that conception can only take place after ovulation and that it requires a living ovum and a living spermatozoon. Hence the questions needing answer are: (1) does ovulation always occur at a given time in the menstrual period? (2) for how long after ovulation does the ovum remain able to accept the spermatozoon? and (3) for how long after coitus is the spermatozoon capable of fertilising? If the spermatozoon remains active for x days, then intercourse $x+1$ days before ovulation cannot be fruitful; and if the ovum remains fertilisable for y days, then the "safe period" begins $y+1$ days after ovulation. Unfortunately x and y remain unknowns—being variously put at a few hours or a few days—and determination of the precise time of ovulation also presents difficulties.

The length of the menstrual cycle varies considerably. HAMAN,[1] analysing data for 2460 cycles in 150 married women who were free from any serious gynæcological abnormalities, finds that the mean

1. Haman, J. O. *Amer. J. Obstet. Gynec.* 1942, **43**, 870.

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duration of all cycles was 28·4 days, the average deviation 1·7 days, and the standard deviation 2·2 days, giving a range of menstrual cycles of 26·2 to 30·6 days. Though 68% of all cycles fell within this range, only 15% of the women actually had a 28-day cycle; 38% had a cycle longer than 28·4 days, and 44% had one shorter. None was entirely regular, and HAMAN believes that if a woman appears to be regular at first, observation over a longer period will soon upset this idea. He concludes finally that the irregularity of the cycle "necessitates caution in judging the applicability and merits of the so-called safe period as a means of birth control."

Obviously this is true, but LATZ and REINER [2] have lately brought forward striking evidence that rules based on the views of KNAUS and of OGINO work well in practice. These rules are based on the hypothesis that ovulation occurs 14 days before menstruation, that the ovum is subject to fertilisation for only a few hours after its expulsion from the graafian follicle, and that the male sperm within the female genitalia cannot fertilise the ovum after 48 hours. LATZ and REINER'S material includes calendar records of 11,249 menstrual cycles over 18 months, sent in by 1000 women from all over the United States, who were using the safe period as a means of avoiding pregnancy. Of 49,356 intercourses charted none took place on the 15th day before the beginning of the next period (i.e., the day when ovulation was deemed most probable), and only 1 and 59 on the 16th and 17th days, while the large majority were well outside the presumed fertile period. The fact that no pregnancies resulted in these women from nearly 50,000 intercourses shows the general validity of the Ogino-Knaus hypothesis. In observations over a number of years LATZ and REINER have been informed of 26 cases of undesired pregnancy said to have followed cohabitation in the safe period, but in only 2 of these have there been satisfactory written records, and for the most part the evidence can be discounted. In one of the 2 probable cases the patient was under treatment for anæmia, which may have deranged the normal cycle, while in the other case ovulation was possibly delayed by a severe cold. It must be recognised that the time of ovulation may be affected by any important disturbance in a woman's life, ranging from a motor-accident to a change of altitude, an illness, a mental shock (as is illustrated by Mr. LOESER'S paper on p. 518) or a long journey. If conception is to be avoided, any extraordinary event before the expected time of ovulation should be followed by abstinence from intercourse until a new menstrual cycle begins. "The safe period," LATZ and REINER point out, "can be depended on only by the normal healthy woman and only under accustomed conditions."

Accepting this last reservation, the data now provided go far to establish the safe period as a means of contraception, and in the investigators' opinion the answers to the three essential questions are as follows: (1) ovulation must occur about 15 days before the onset of the next period; (2) the time for fertilisation of the ovum is "very short"; and (3) the life of the sperm cell inside the female genitalia is less than 48 hours. Whether these observations and deductions are accurate are matters of moment both for people who do not want a child and for those who do. Unfortunately they are not entirely borne out by the experience of other workers, as reviewed by DICKINSON,[3] and it would be very interesting to have a carefully planned inquiry on similar lines in this country. Serious and continuous coöperation would be needed from a large number of women who have already borne one or more children and are presumably capable of conceiving again.

2. Latz, L. J. and Reiner, E. *Ibid*, 1942, **43**, 74.

PEP 200

THE two-hundredth issue of *Planning*, the fortnightly broadsheet of Political and Economic Planning, reviews the remarkable progress of that organisation in its first twelve years. PEP has, in fact, devised a new technique in political and economic research. This type of research is inevitably more complex than in the natural sciences; the chain of causation is multiple and tangled, and the investigator is inside instead of outside his material. But, by patient fact-finding and the moulting of preconceptions, it can be done, as PEP has proved. In particular, they have brought the technique of group research to a high degree of perfection. Each group consists of from eight to twelve people—one or two non-experts, and the rest a judicious mixture of academic and practical workers in the field under discussion. The collator and coördinator is a whole-time research secretary, whose interim and draft reports circulate not only inside the group but to many experts outside. One thing is essential: inside each group there must be personal harmony and faith in the fact-finding approach. And best results have been achieved where members have combined a mastery of their subjects with wide vision. From these groups have flowed the series of broadsheets, on the machinery of production and distribution, on the social services, and on international trade. Sometimes they have stood on their own. Sometimes a group of broadsheets have been precursors of a major report, and each of these is now a standard book of reference. Medical readers will be most familiar with *Britain's Health Services*, but there are as comprehensive works on the press, the coal, gas, and electrical industries, cotton, iron and steel, agriculture, and the social services.

3. Dickinson, R. L. *J. Contraception*, 1938, **3**, 219.

THE Students Representative Council of the University of Malta have written to the British Medical Students Association to say that they are seriously short of essential textbooks. They mention Gray's *Anatomy*, Bigger's *Handbook of Bacteriology*, Cushny's *Textbook of Pharmacology and Therapeutics*, Clark's *Applied Pharmacology*, Price's or Osler's *Medicine*, Green's *Manual of Pathology and Morbid Anatomy* and Kerr's *Textbook of Obstetrics and Gynæcology*. Most of the students at present have no books. The lucky ones have books dating from the time of Lister. Before the war Maltese students completed their training abroad; but the opening of a clinical teaching department and the shortage of shipping space have combined to produce the present situation. The Colonial Office has undertaken to give every possible help in getting books there, and the BMSA is prepared to collect them. Anyone who cares to give unwanted medical textbooks should send them to the Secretary, British Medical Students Association, BMA House, Tavistock Square, London, WC1.

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Annotations

THOUGHTFUL AID

Colonel Elliott G. Cutler, of the United States Army, began his lecture at the Royal Naval Hospital, Chatham, on April 9 by quoting Ambroise Paré's dictum: "The person who first dresses the injured patient can save or mar that patient's life." The three main principles of such dressing are, he said, the control of hæmorrhage, of pain and of infection. The doctor called to a disaster should remember two others: treat the patient before the local condition, and treat the terror that surrounds all catastrophes. Familiarity with disaster should give the doctor an equanimity which will allow him to make wise decisions amid dangers and horrors, and he should do his best to infect others with his serenity. Except in hæmorrhage, where immediate attention should be instinctive, the watchword should be: "Think before you act." The fractured tibia should not be dragged across the road to a more comfortable seat, and the open chest wound should not be rushed pick-a-back to the aid-post, for the rush may kill him. Dressings held ready for emergencies should be large, for a wound that needs but a small dressing can do with none at all. The British Army have learnt this fact and are replacing the tiny first-aid packet by the more adequate shell dressing. Every first-aid kit should contain artery forceps and ligatures, for a bleeding artery should be tied. If the bleeding vessel is inaccessible the doctor should be able to ligature it higher up—for example, any doctor dealing with wounded men should be capable of ligaturing the subclavian artery for hæmorrhage from the axillary. Direct attention to the wound is what counts; Colonel Cutler had his doubts about the value of the tourniquet, for when one is applied the limb is almost always lost, but he thought it justified its place in the first-aid kit.

For the control of pain, Colonel Cutler urged that morphia should be given generously. Old people and young children, and those who are ill as well as injured, require only small doses, but the young and healthy man in pain must be given half a grain or more by mouth. Rapid action is needed, so morphia is better given intravenously whenever possible. 'Pentothal Sodium' has been found the best form of general anæsthesia on the battlefield, though chloroform capsules have proved useful as a rapid form of anæsthesia when, for instance, a wounded man must be got out of a tank. Bomber crews carry morphia for injection inside their flying suits, so that the solution does not freeze. A slit in the suit, which can easily be pulled open, provides a suitable spot for the injection. Flying suits are massively constructed, and no small scissors will cut them open if access must be gained to the wounded part; a knife is now carried on each suit for this purpose. In the bomber each member of the crew should have his first-aid kit on his person. The wounded man is often unable to open a heavily sprung first-aid box, and zipp fasteners for first-aid kit are apt to jam when most needed. At great heights it is difficult for the crew to attend to one another's wounds, because their hands freeze the moment they remove their gloves. This is still an unsolved problem. It has been learnt, too, that it is no use having a beautifully designed first-aid box in a tank, for when a tank receives a penetrating hit, it usually catches alight, and when the crew escape they find themselves without first-aid dressing. Each man now carries his own dressing and other needs.

Experimenters are still trying to find the best way to control early infection. The American soldier carries 5 grammes of sulphanilamide powder to dust over his wound, and 4 grammes of sulphadiazine to take by mouth when he is wounded. Controls are being carefully observed but in about 600 cases cold-blooded figures have shown that these measures make no difference. Similar experiments have been going on for about a year in America, and the last report on over a thousand cases concludes that sulphonamides do not greatly influence the incidence of infection, but may reduce the virulence of the infecting organisms. The soldier has great faith in these drugs and this confidence is not to be lightly dismissed. Altogether, Colonel Cutler had no doubt that the sulphonamides should be used. Of resuscitation methods, he said that plasma has been a great boon, but its use can be overdone. No wounded man needs blood or plasma unless he is in a state of shock, but then he needs at least a litre. Transfusions should not be needed after a "cold" operation; hæmostats are provided to prevent this. The surgeon who needs to give many transfusions in his routine work must be careless. Between battles, the Army doctor should sort out his kit; equipment is often too complex, and much junk is taken into battle unnecessarily. The doctor may spend some of his sleepless nights on plans to prevent wounds and wound infection. Thus Ascroft has found in head injuries that people with long hair get more infection; if hair was cropped as a routine before battle, perhaps another 5–10% of head wounds would be saved. To prevent infection from clothing bombing crews might wear sterile suits. It is easy to autoclave a flying suit, and an autoclave could be carried with the bomber crew's equipment as they move from field to field.

DAMAGE OF INTESTINE DURING IRRADIATION OF THE UTERUS

In the last 25 years much has been written about the technique and results of irradiation for uterine cancer, but comparatively little about its secondary effects on surrounding healthy tissues. It is known that in certain clinics where intracavitary radium treatment alone was relied upon for the treatment of carcinoma of the cervix, and the usual precautions were taken, early intestinal reactions were very rarely encountered.[1] In the great majority of cases there was no such complication and the general, as well as the local, condition of the patient improved steadily during treatment. On the other hand, when deep X-ray therapy was combined with radium therapy, slight diarrhœa lasting 2–3 days became not uncommon, and it seems highly probable that combined radium and X-ray treatment, when too intense or protracted, will cause a high incidence of injuries. Aldridge,[2] recording experiences at the Woman's Hospital, New York, from 1937 to 1941 distinguishes three types of degrees of tissue reaction—namely, (1) an acute proctitis or proctosigmoiditis, (2) ulceration, and (3) formation of perirectal fibrous tissue. Symptoms may develop immediately after treatment or at any time up to years later. Abdominal pain, diarrhœa, rectal tenesmus, and passage of blood and mucus are usual symptoms. Sometimes the initial symptoms are those of intestinal obstruction; they may be due to temporary partial obstruction caused by œdema and spasm of the bowel at the site of an intestinal ulcer or to a true organic stricture by scar tissue. Aldridge reports that 31 out of 142 patients treated for carcinoma of the cervix developed post-irradiation intestinal injuries, including 23 intestinal strictures. He recognises that this incidence is high compared with that recorded previously, but he attributes the apparently higher morbidity to the fact that he has reported every case of proved injury even when it showed only transient symptoms.

Acute proctosigmoiditis is the mildest form of intestinal injury observed. Characteristic intestinal symptoms, appearing during treatment or soon after its completion, give the first warning. Examination will reveal a local

1. Hurdon, E. Cancer of the Uterus. London, 1942.
2. Aldridge, A. M. *Amer. J. Obstet. Gyn.* 1942, 44, 833.

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inflammatory process involving the anterior wall of the rectum at about the level of the cervix; but with a bland diet and suitable palliative treatment these mild injuries heal spontaneously. When the damage to the bowel is greater, an ulcer may develop, again usually on the anterior wall of the rectum. Rectal examination shows the ulcer, some 1–2 cm. in diameter, covered with a greyish slough and surrounded by an area of intense hyperæmia. In a small proportion of cases there is perforation of the bowel into the peritoneal cavity, the vagina or the perirectal tissues. Ulcers tend to heal slowly with the formation of fibrous tissue. In some cases this increase of fibrous tissue reduces the lumen of the rectum, and symptoms of a partial or complete obstruction may develop. The third type of primary intestinal lesion is the extrinsic lesion, where the injury seems to have involved the perirectal tissues, leading to diffuse formation of fibrous tissue. It is difficult to differentiate this from the so-called frozen pelvis caused by massive invasion by malignant growth. As healing proceeds, the large bowel is likely to be disturbed by contracting fibrous tissue and by external pressure causing intestinal obstruction. By routine studies the existence and location of intestinal strictures can be determined. Decision as to whether palliative therapy should be considered or whether operation is necessary is usually based on the symptoms and on the results of X-ray studies. In a series of 38 cases of irradiation injuries 29 had intestinal strictures as proved by radiography, and in 18 of the 29 cases with strictures, symptoms were relieved or controlled by palliative means.

Aldridge rightly points out that where intestinal injuries have followed combined radium and X-ray treatment it is often impossible to say whether they have been caused by the radium or the X rays. Recalling the comparative freedom from such complications of large numbers of cases treated with radium alone, it is hard to avoid the conclusion that the introduction of the combined radium and X-ray technique has increased incidence of these injuries, and perhaps the most important of several suggestions he puts forward to prevent them is that which advocates a reduction of intensity of irradiation—not only by using smaller amounts of radium and increasing duration of exposure, but also by decreasing the size of the fields of X-ray exposures and the amounts of X irradiation per treatment.

THE HYPERMETROPIC MINER

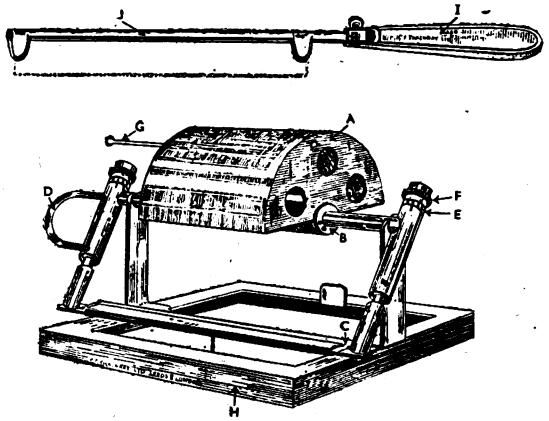
DUST and heat make it impossible for a miner to wear spectacles at the coal face. But his work requires a constant effort of accommodation. If the miner is emmetropic he will be capable of producing this effort until the age of 55 or over; but not so the hypermetrope, who will experience symptoms of accommodative asthenopia at an earlier age, depending on the degree of his refractive error. If he is myopic, no accommodative effort is required, and so the problem does not arise. Christie Reid [1] has collected 20 cases in the past two years in which a moderate hypermetropic error brought a man out of the pit at an early age, because he was incapable of producing the necessary accommodative effort without getting headaches and eyestrain. Reid found that if the error was between 2 and 4 dioptres the man would have to leave the pit at about the age of 37; if 4 dioptres or over few could go on beyond the age of 30, while with 6 dioptres no man should go down the pit at all.

The problem becomes more serious if, as is not unlikely, the hypermetropia is associated with a squint, for this will mean that one eye will almost certainly be amblyopic; and should the sound eye be lost or damaged by injury the man will be rendered unfit for any work for which good sight is essential. Reid is of the opinion that all the symptoms cannot be attributed to an overworked ciliary muscle, and suggests the conflict between a dilated pupil and a contracted ciliary muscle as a possible explanation, for this is the reverse of what is required in daylight vision, where the accommodation convergence reflex produces a small pupil. The remedy seems to be in an eye examination for all miners before they go down the pit. For this the routine pit-head examination is insufficient: a competent authority must be called in.

1. Reid, A. C. *Brit. J. Ophthal.* 1943, **27**, 110.

SKIN GRAFTING SIMPLIFIED

THE view that the best dressing for a wound which cannot be sutured is skin is not yet being applied as it should be, and one of the chief reasons is that considerable experience is required to cut a satisfactory Thiersch graft. The surgeon who has not this experience and wants to do his best for the patient will find the cutting of thin and intermediate grafts much simplified if he uses the dermatome evolved after some years of attempts by Padgett [1] of Kansas City. Fifty of these dermatomes came as a gift from the American Red Cross early in



Improved Padgett Dermatome.—A, drum with roughened outer surface. B, mounting which allows drum to rotate freely on axle or to be fixed by pins (not shown) passing through holes in vertical pillars of frame and in mounting. C, blade-holder. D, handle. E, calibrating mechanism. F, milled screw for adjusting distance between blade and surface of drum, and hence thickness of graft; each "click" represents 0·002 in. G, safety device for use when dermatome is being carried; rod can be pulled out to act as stop against blade-holder and prevent drum rotating. H, frame. I and J, handle for holding blade during honing or when cutting razor grafts.

the war and were distributed to EMS plastic units, orthopædic centres, &c. The principle of the dermatome, a modified version of which is here illustrated, is that the skin of the donor area is held in contact with a semi-cylindrical drum by adhesive cement while a fixed knife-blade transects the skin at the desired depth as the drum revolves. The graft is left adhering to the drum and is removed with forceps and applied direct to the wound. The dermatome can be used for cutting grafts from the thigh, back or abdomen. Sheets of skin up to 4 × 8 inches in area (the size of the drum) and from 0·01 to 0·028 inch thick can be cut with ease, the thickness depending on the setting of two screws at the side of the drum. A high percentage of successful takes can be obtained in recent wounds provided that a thorough excision can be performed within a few hours of the injury and that the damage to the underlying muscle is not extensive. The dermatome is now made in England by Messrs. C. F. Thackray of Leeds.

ARTIFICIAL LIMBS FOR CHILDREN

SINCE 1936 adult civilians have been able to get artificial limbs through Queen Mary's Hospital, Roehampton, if they need them to follow useful employment, and from now on similar facilities will be available for children of school or preschool age. When a child requires amputation the local education authority will

1. Padgett, E. C. *Surg. Gynec. Obstet.* 1939, **69**, 779.

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notify the regional commissioner of medical services of the Ministry of Pensions, and where necessary the child will be transferred to one of the ministry's hospitals, at which the operation will be performed and arrangements made for the construction and fitting of the artificial limb under the supervision of the Roehampton limb surgeons. The period of inpatient treatment will be kept as short as possible, and as much as can be of the preparation of the stump will be carried out in an outpatient department or limb-fitting centre. The average cost of standard types of artificial limb is £13–£19 for a wooden and £22–£32 for a metal leg, and from £12 10*s*. to £30 for an artificial arm. Parents will have to make their own arrangements with the manufacturers for repairs and renewals. The experience of the Ministry of Pensions has proved the great importance from the mental, physical and economic aspects of fitting an artificial limb at the earliest possible age. It is a mistake to delay such fitting until a child has stopped growing.

"SUBJECT FOR DISCUSSION"

A FEW months ago the Ministry of Information changed its film-making policy. Until then, it had been turning out a new five-minute propaganda film every week. Many of these were highly successful, but the general level was uneven, and it was becoming increasingly difficult to compress the Government's messages into such short periods. So it was decided instead to produce one fifteen-minute film a month. The fifth of this "Into Battle" series, as it is called, is *Subject for Discussion*, made for the Ministry of Health and the Central Council for Health Education. The story is laid in an ARP post, where a weekly discussion group is being run. The local doctor has been invited to open the discussion the following week, and the chief warden, whose prototype may be seen every morning on the London suburban trains, is horrified when the doctor wants to speak on venereal disease. Each member of the post, including the old lady who "does" for them, is brought in as the doctor makes his case, and the story he has to tell is illustrated by a family infected with syphilis by the father. In the end, the chief warden is converted and the film ends with him chalking up: "Subject for next week's discussion—Venereal Disease." This little tale is acted superbly by Milton Rosmer, Cecil Bevan, Ann Davis and others, and the technical side is ably illustrated by the staff of Guy's Hospital VD clinic. Its script is clear, though it is a pity that the location of the chancre in syphilis is not stated; there is no such unfortunate reticence in the case of gonorrhœa. An ex-soldier opens the sequence quite naturally with the words: "What about gonorrhœa, doctor—clap as we used to call it in the Army?" The dangers of playing to the gallery have been entirely avoided. As a piece of medical education for the people, the film should get full marks. The objections of the public to such a film are put into the mouth of the chief warden, and are answered by his peers. But one is left with an uncomfortable feeling. How many of us are prepared to give up our scanty spare time to opening a discussion in an ARP post? We recognise our duty to the sick, but our additional duty of educating the fit has not yet been as seriously accepted. *Subject for Discussion* has a lesson for doctors as well as for the public. Doctors who want to arrange for its local showing should get in touch with the films officer at the office of the Ministry of Information for their region.

HEAD WOUNDS IN THE MIDDLE EAST

SPEAKING to the section of neurology of the Royal Society of Medicine on April 15, Major P. B. Ascroft gave an account of 516 cases of gunshot wounds of the head treated by a neurosurgical unit in the Middle East. Of these, 85 had an injury of the scalp alone, 139 had an associated skull injury, while in 292 the dura had been penetrated. Despite the difficulties arising from the terrain and long distances for evacuation, it was possible to operate on nearly half the cases at the base within 72 hours. The mortality in the series was 9·1%—a remarkably low figure. Of the cases that recovered, 71% returned to duty, and more than half to full duty. These figures call for congratulation to the team led by Ascroft, and they demonstrate the value of a specialised unit. But our tribute must not be entirely one-sided, for the return to duty of 310 men must have been partly due to a high degree of fitness and morale in the soldiers themselves.

The figures given brought out the importance of thorough operation. Results of cases primarily operated on by a neurosurgical unit equipped with suction, diathermy, and other special equipment were better than the results of cases operated on earlier in the forward areas. If there is reasonable prospect of evacuating the case within 72 hours of injury it is better to do nothing in the forward area except to dress the wound and give sulphonamide. Wounds with penetration of the dura claimed the majority of deaths, meningitis or cerebral abscess being the commonest fatal complication. In-driven fragments of the skull are the most potent source of infection, and every effort should be made to remove them and to clean the track they have made. The missile itself is of less importance, and should not be removed if it has penetrated deeply into the brain; in Ascroft's series the incidence of brain abscess did not seem to be higher when the missile was left in situ. The usual site for the development of an abscess is in the track superficial to the missile. An abscess developed in 75 cases, with a fatality-rate of 23%. There was no case of abscess where the dura was intact. The usual method of treatment was drainage of the abscess and the track leading to it; tapping and aspiration were seldom used. Although focal signs may be present even with scalp wounds, they are naturally commoner and more severe with penetrating injuries. A feature to which Ascroft drew attention is the remarkable degree of functional recovery that may be made by patients with extensive paralysis due to cerebral damage. Sulphadiazine was given as a routine both in the forward areas and at the base to all gunshot wounds of the head. In this series dehydration was not used in treatment; many of the patients were already dehydrated and indeed were in need of fluid by the time they reached the base. Drainage by lumbar puncture was employed only in the treatment of fungus cerebri.

Lord MORAN has been re-elected President of the Royal College of Physicians of London.

Sir COMYNS BERKELEY has been re-elected chairman of the Central Midwives Board for the coming year.

The Royal College of Surgeons of England has conferred its honorary fellowship on Madame CHIANG KAI-SHEK in recognition of her work for the relief of suffering and for the advancement of medicine in China. It is hoped that if she is able to come to this country she will visit the college to receive the diploma.

VITAMINS FOR EXPECTANT MOTHERS.—On April 18 the distribution began of capsules and tablets made from specially concentrated fish-liver oils to expectant mothers. Each capsule contains 4000 international units of vitamin A and 800 IU of vitamin D. Packets containing a six weeks' supply may be obtained through welfare centres, clinics and food offices for 10*d*. in stamps, or free, according to income.

ROYAL SOCIETY OF MEDICINE.—At the section of medicine of this society on Tuesday, April 27, at 4.30 PM, Captain Alfred Kendrew will speak on human adjustments to cold environments in North Russia, and Dr. J. B. M. Green on Antarctic experiences in the royal research ship *Discovery*. On April 30, at 4 PM, cases will be shown at the section of ophthalmology and there will be a clinical meeting at 5 PM.

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Special Articles

ACCIDENT SERVICES AFTER THE WAR

LIKE others, the British Orthopædic Association have a vision of a better organised Britain, and have set out their ideas on a comprehensive accident service of the future. This they believe to be a natural development of fracture services organised on the lines laid down by the British Medical Association and later by the Inter-departmental Committee on Rehabilitation, before the war. The principles enunciated then remain valid: that aftercare in the treatment of fractures is no less important than primary treatment; that a special organisation is needed to cover surgical and remedial treatment from the time of injury to the restoration of earning capacity; and that continuity of inpatient and outpatient treatment in a single department by a single team is essential.

SCOPE OF THE SERVICE

The association considers that the service should cover treatment not only of fractures but of soft-tissue injuries, infections of the hand, burns, tendon and nerve injuries—indeed, all injuries of the motor system. Injuries of other systems would not be excluded, but it is felt that injuries to the motor system are likely to predominate, and that the service should work jointly with the existing fracture services and should remain under the direction of orthopædic surgeons. These principles have been followed in some military hospitals; but there has been little organisation of the kind for treating fractures in industry, and though many teaching and general hospitals now have fracture departments, few have special accident departments. The association point out that the casualty officer, often a junior resident, has the responsibility of treating wounds, lacerations and soft-tissue injuries unguided by senior members of the staff. Inexperienced young surgeons who would hesitate to remove an appendix, or even to inject a varicose vein, are left to undertake the far more difficult—and, for the patient, more critical—task of treating wounds of the hand and fingers and suturing divided nerves and tendons. Patients attend hospitals for daily dressings, but progress is not closely supervised, activity is not graduated, and aftercare and rehabilitation are imperfect.

THE UNIT AND ITS TEAM

The casualty departments of existing hospitals should be replanned, the association suggest, and if need be rebuilt. Accident cases should be brought in by a separate door from medical and surgical emergencies. The unit should have many cubicles where shocked patients can be prepared for necessary surgical care or treated for shock, and there must be ready access to a radiographic department and to emergency theatres equipped for the excision of wounds. Beds must be available, and it is proposed that in every ward one masseuse, nurse or orderly should concentrate on early rehabilitation. Treatment must be continuous from the emergency operation, throughout inpatient treatment, outpatient supervision and rehabilitation. Secretaries should be employed to keep records of the clinical notes made at each stage, thus releasing almoners to carry on their proper function as social-service workers. Dictation of clinical notes must begin when the patient is first examined in the casualty department and must be continued in the X-ray room, theatre, follow-up clinic and rehabilitation departments. Records should be filed and cross-indexed with the radiograms and clinical photographs. The almoner will have her hands full in keeping touch with the general practitioner, work's medical officer, employer, trade-union and with agencies concerned with compensation, relief of distress, the learning of new trades, and resumption of work.

The association believe that the service must be kept in the hands of orthopædic surgeons because their specialty is wide and based on a broad foundation of surgical knowledge. They do not believe that a new type of surgeon specialising in the treatment of injuries should be developed: his field would have to be too comprehensive, covering besides surgery of the motor system such things as abdominal, thoracic, faciomaxillary, ophthalmic and cerebral surgery, most of which are better treated by those who have specialised in the region concerned. The director of the service in any region should be, they think, a man trained and experienced in general and orthopædic surgery, and especially in problems relating to trauma; he will collaborate closely with colleagues who accept responsibility for treatment of visceral or other special injuries, with physicians diagnosing and treating shock, and with bacteriologists investigating wound infection.

The size of his staff must be measured by the work undertaken. Since the unit must give a 24-hour service the staff should include at least two highly qualified, fully experienced first assistants, aided by resident surgical officers, house-surgeons and house-physicians. Expert anæsthetists must be available at all hours because shocked patients are so often bad risks.

It becomes evident from the proposed nature of the service that it will best be housed in a general hospital rather than in a special accident hospital, though it may well be in a separate unit of that hospital. Indeed, the association feel that "provided that it is jointly staffed and in direct collaboration with a general hospital service, segregation of accident cases is desirable." Hospitals with fully developed units must be associated with neighbouring country and cottage hospitals, so that an injured patient admitted to such hospitals will get the same standard of care as one admitted to the parent unit. That of course implies regionalisation.

The unit must also maintain close touch with industrial medical officers in the area it serves, and keep them informed of the progress of their patients. These MOs will have the task of establishing the man afresh in his job when he returns to work. The nursing staff at the factory should have been trained at the accident unit. The surgeons at the unit should be familiar with conditions in local industries, and there should be interchange of staff, ambulances and medical services between the factory medical department and the accident unit. A strong liaison should also be maintained with general practitioners in the neighbourhood.

REHABILITATION

Injuries to sedentary workers and those in light industry can be rehabilitated, the association suggest, by physiotherapy and recreational and gymnastic treatment in the hospital to which the unit belongs; and all phases of this treatment must be available for inpatients and outpatients of both sexes. There should be a gymnasium and treatment rooms, special equipment and trained staff. Sometimes basements, upper floors or outbuildings or part of a waiting-hall can be used for a gymnasium, and equipment should include medicine balls, light balls, nets for deck tennis and volley ball, skittles, pulleys and weights and the simpler types of occupational therapy apparatus. The staff of masseuses, occupational therapists, medical gymnasts and physical training instructors should work as a team with the surgeon, assistants, nurses and secretaries to refit the patient for his life and work.

More seriously injured patients who must return to heavy industry will need treatment in a country rehabilitation centre where residential treatment in an appropriate atmosphere can be combined with the use of playing-fields and a swimming-pool. For many patients psychological treatment is an important part of rehabilitation and can best be given under residential conditions; if weekend leave is granted and the centre has a happy atmosphere, patients are usually willing to attend voluntarily.

At various stages in his treatment the patient may be transferred to the centre, then back to hospital for a time and then back to the centre. His clinical record should accompany him, and the secretaries in both places should work in harmony. House-surgeons should spend part of their term of residence at the rehabilitation centre, and nurses and masseuses should take part of their training there. For the final stages of treatment, which may continue after work is resumed, the factory medical service might be developed so that the patient could take his half-hour of physiotherapy and supervised exercises without leaving the factory. A small number

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of patients will have to learn a new trade, and this calls for the close coöperation of the accident unit, rehabilitation centre and almoner with the industrial medical officer and retraining workshops. Rehabilitation is part of treatment and must, in the view of the association, remain under medical control in all its phases. Treatment is complete when the patient regains confidence in his ability to work and knows work will be available.

PALESTINE

A NEW HOSPITAL

THE first Palestinian hospital for tuberculous children was opened last year at Mekor Hakim, a suburb of Jerusalem, where the Anti-tuberculosis League maintains a sanatorium for adult patients. The new children's hospital contains 30 beds, but so far it has only been possible to open 10 of them owing to lack of funds.

HEALTH MEASURES

Last year in February the Health Department undertook to drain the marshy area between Haifa and Acre which has long been a breeding-ground for malarial mosquitoes. In less than three months the sanitary engineers were able to declare the whole area free of these pests. The work entailed cutting a channel from the Kirdaneh springs to the sea, 8 miles away, and an area measuring 1,000,000 sq. m. near Acre has been filled in. In all 2,500,000 sq. m. of land have been opened up for habitation and intensive cultivation, at a cost of about £P40,000.

As in Great Britain, quinine has been reserved entirely for the treatment of malaria; and the sale of other important drugs has been controlled. These include insulin, neoarsphenamine and other arsenicals. The reserves are being held by wholesale pharmacists throughout the country and may only be sold when a special permit is presented. Diabetic patients can get insulin at reasonable prices from the Health Department, on producing a doctor's prescription. Free inoculation against typhoid has been offered by the department and thousands of citizens have made use of this opportunity with consequent lowering of the incidence of the typhoid group of infections. TAB vaccine is produced, in quantities sufficient to meet the country's needs, by the laboratories of the department, which are also responsible for smallpox lymph and rabies prophylactic.

DOCTORS GATHER IN PALESTINE

A preliminary meeting has been held to plan the establishment of a French medical association in Jerusalem. General Catroux and Surgeon-General Guirriec, director-general of the Free French health services in the Levant, are on the committee. The new association will encourage contacts between the many physicians with French training, now in the Middle East. Meetings are to be held regularly in Jerusalem and Beirut, and all doctors interested in French medicine are invited to attend.

At the end of last year Polish doctors in Palestine arranged a conference at Tel-Aviv; some 200 attended the first meeting, held at the Strauss medical centre, many of them being military and refugee physicians. Professor Mandl (Jerusalem) read a paper on wound healing hastened by tissue extracts; Dr. Markus (Tel-Aviv) discussed functional disturbances of the viscera after external injury; and Dr. E. Wodak (Tel-Aviv) showed cases demonstrating the importance of facial surgery in war-time. The next day a meeting was held at the Polish military camp where Dr. Laskiewicz, the chairman, discussed labyrinth operations and some examples of plastic surgery were shown.

A NEW INSTITUTE

The Jewish University has gone another step towards the founding of a medical faculty in the establishment of a Pharmacological Institute under the directorship of Professor Wertheimer. It is to be maintained by funds provided by the Hadassah Organisation in the United States, and will supplement the work of the present post-graduate medical department of the university. It will offer opportunities to research students in pharmacology and is expected to give valuable help in developing the pharmaceutical industries of the country.

In England Now

A Running Commentary by Peripatetic Correspondents

I HAD just arrived at the hospital and my junior was showing me round. "What side are you on politically?" he asked. "I mention it because the superintendent is definitely Right Wing, and likes talking, and as most of us are Left there is a lot of argument in the common-room." "What side," quoth I in return, "are you on in pathology?" "I am afraid I don't understand, doctor." "No, of course, because you can't take sides about a science. Pathology is a great mass of accurate observation on disease from which one can by the application of strict scientific criteria make certain deductions. These may lead to beliefs which are correct or not, but you cannot properly take sides about pathology—unless you become a chiropractor, or the like. Why should I take sides politically? Politics is a great mass of social pathology on which you can make observations in exactly the same scientific way if you have the ability. The results will not be so accurate, for one is dealing in the main with even less commensurable data; and techniques for making the observations are sketchy. It is true there are three main and a host of subsidiary so-called parties which claim to represent systems of political thought. But it appears to me that the systems are fortuitous groupings of unrelated ideas which largely overlap on the other groups, though the different idioms in which the ideas are expressed prevent general recognition of this fact." This pedantic broadside was too unexpected and there was no return fire for the length of a ward. "But, I say, I mean, we have to take sides about important subjects or we wouldn't get anything clarified or settled."

I felt this action had to be decided once and for all. "The Chinese have a proverb: 'If every man confined his observations to subjects on which he was qualified to speak, there would be throughout the world an almost deathly silence.' It is much more elegant in the original, but that conveys the sense. Now if politicians used only those terms they were prepared to define as precisely and accurately as would be required in a dissertation on pathology, speeches would anyhow be briefer." I felt I was not being exactly parsimonious of words myself, but no matter. The junior at last managed to interrupt, "Take the Beveridge Plan. . . ." But two can play at that game. "Exactly, take the Beveridge Plan. How can one take sides about such a proposal? All men of goodwill desire betterment of social conditions. That is self-evident. Here is a plan which is designed to that end, but which is highly complicated and impinges on a number of quite separate aspects of the social structure. It is the most extensive plan yet put forward in detail. Though the principle behind it is accepted with hardly a single dissentient voice, the manner and extent in which it can be implemented are still unsettled. The detail is extremely technical and the administrative problems and their implications must be examined by experts working scientifically and dispassionately. Admittedly, the plan itself is detailed, but it is exactly analogous to the blue print of a complicated chemical plant. Information about the anatomy of the plant is given, but the way in which it can be set up requires to be worked out, and this must be done before you can go further. Certainly you cannot take sides." "But, you know, what you say strikes right at the roots of the party system." "Yes," I said.

The truth is, my political feeling is as strong as anyone's, but conversations at the dinner table in the common-room are better restricted to Bach, or Wimsey *v.* Poirot, to "when I was in Brazil," or cheese and horticulture. One would even admit shop and the story about the commercial traveller. Anyone may differ from me about Degas or Wordsworth, and my admiration for him will not abate one whit; but in political argument there is too great a temptation to consider one's vis-à-vis either foolish or antisocial.

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These days when clothes coupons are short and utility suits grow shorter it is becoming ever more difficult to appear respectable, and there comes a stage, if it has not already arrived, when even "make do" tactics fail. Here is my remedy. I understand that Army Stores

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have thousands of yards of tartan rendered immobile by the 51st Highland Division having to wear battle-dress—Gordon with its yellow stripe, Seaforth with its white, the dark sombre green of the Black Watch, the flashing red of the Camerons, the lighter green of the Argyles. Let these be made into "Victory Patches," to eke out the life of trouser knees, jacket elbows and other anatomical areas subject to undue wear and tear. All profits would go to the Chancellor of the Exchequer and help to win the war. We would take pride in appearing in public with the seat of our pants a flaming fire, and our elbows paying tribute to the ancient Mackenzies. Our streets would be as gay as a peace-time flower bed and our hearts uplifted by this blast of sight as a military band uplifts them with its blast of sound.

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I have had the privilege of living for several months in a seaboard town of one of the smaller and less wealthy of the United States, with the opportunity of seeing at close quarters the way of life there, as well as the work in hospitals. We were greeted on arrival by a fine, warm day, with large red butterflies flitting about the quarterdeck a good two miles from shore. First impressions as we steamed slowly into harbour were of enormous space, a smokeless and clean dockyard, a characteristic smell and an atmosphere like that of a world exhibition, partly attributable to the little motor-bicycles and caterpillar-cars which had been taken over from the Chicago fair. It took us some time to get used to a dockyard equipped with a golf course, officers' social club, shops, a swimming bath, a residential quarter where pleasant houses for officers and their families stood among lawns and pine trees, and a modern hospital where every type of work is done, from X-ray therapy to obstetrics and gynæcology. Land has a different value here from that in our crowded little island; an area of (say) twelve square miles for a dockyard is no sooner suggested than acquired.

It did not take long for us to be caught up in the famous American hospitality. I was lucky enough to go about a hundred miles inland with a friend to stay with the superintendent, or as we would say an estate manager, of a large old plantation now used as a winter residence by a banker from Detroit. Here we had five grand days of hunting, fishing and riding. The shooting at that time of year was not very good—duck and quail were only just starting—but it was a pleasure to watch the best dogs I have ever seen at work. There were about six pointers, two Llewelyn setters and one English setter in the kennels, and we would go out with a pair, usually a pointer and a setter, and see if we could raise some quail. The energy and skill of these dogs was something to marvel at. The fishing was in little lakes down in the swamp, an enormous area of cypress forest between the plantation and a large river, in which it was easy to get lost for days. The negroes know this area like the back of their hand and have performed wonderful feats of localisation. We would fish for bream with a long bamboo cane rigged up with a length of black thread cut to the length of the cane, a small cork float and a hook. With wood-sawyers for bait and a bit of patience and skill in striking, a large number of small bream could be caught for Herbert the old negro to fry for our lunch. Meantime Herbert was specialising in carp; using the same tackle only fishing on the bottom he would catch about half a dozen up to three pounds each in a day's fishing. My friend with a thread line and spinner, bought in Edinburgh and used with great success on the brown trout in Iceland, had a lot of success in these lakes with the bass. Fly casting was difficult as the lakes are small and the cypress trees very large and thick.

The superintendent, his wife and family of five live a simple and healthy life. Tea, coffee and sugar were the only things to appear on their table during our stay that did not come directly from the plantation. But it was reminiscent of prewar England to realise that this was a sporting estate, and sad to see that most of the land, which during the last century was producing cotton, corn and rice, is now almost derelict with only an occasional field of corn and inferior cotton. The country is thickly wooded with long-leaf pine, various oaks, large and colourful hickory trees, and cypress in the low lying areas. The trees are all heavily draped with long grey streamers of Spanish moss, which give them, for me, a rather mournful appearance, but which for the native have a cheerful atmosphere of home. I tasted my first wild persimmon and wondered why this fruit is not cultivated, for it has a sweet, delicious flavour. The deer seem to like it too: the ground was thick with their spoor.

* * *

The other day I received two letters from patients who had been transferred from my parent hospital to the EMS hospital where I now work. The first came with a covering letter from a colleague saying that the man was a very decent fellow and could I please do something to try and raise the standard of treatment and make it worthy of our old hospital. The patient's letter was full of complaints of neglect, and said that the place used to be a lunatic asylum and still lived up to its name. Among other things the radiogram went on all day and the nurses danced with each other, and it was simply like Bedlam. After reading the letter I guessed correctly that it had been written within 24 hours of the patient being admitted. On inquiry I found that he had gone to a large ward on the ground floor; the windows had been partially bricked up for protection against blast, making it dark and gloomy, albeit safer. The ward was not full and the number of nurses was adequate. He had been put next to an old man with aphasia and had apparently sulked the whole day. The dancing of the nurses was part of a New Year's party given then because the ward had had to be kept quiet at Christmas time because a man had been very seriously ill, but had now recovered. The patient a week later was said by the sister to be a very nice man and useful in helping with the work of the ward. When interviewed by the matron he could not speak highly enough of the treatment of the medical officers and the kindness of the nurses. He was horrified at the idea that the nurses might hear anything about his complaints. He explained that he had no idea that a ward party was being held on his first afternoon in hospital.

The second letter came from a man who had been in a first-floor ward, with plenty of unblocked windows. It is, however, usually fuller than I like for the size of the kitchen and lavatory accommodation, and the nurses often work under great difficulties. He wrote spontaneously after leaving hospital to say how much he appreciated the care and attention he had received.

I think that the conclusion which may fairly be drawn from these two letters is to pay no attention to a letter or the complaints of a patient who has been in hospital for 24 hours only, but to consider seriously everything that is said by a patient who has been in hospital for several days since it may be possible to improve the "emergency conditions." A ward built nearly 100 years ago for mental patients cannot, of course, be anything like so suitable for EMS purposes as one erected in the last 10 years; but good nursing and kindness will make up for defects.

* * *

There is something about his Gallic enthusiasm, the inflexions of his voice and shoulders and the droop of his eyelids that reminds one of Maurice Chevalier—the Maurice Chevalier of the early twenties at the Paris Casino. His nonchalance in anteroom and mess, where he is invariably surrounded by a bevy of women MOs, accentuates the resemblance. His lectures pass all too quickly. He knows his subject and delivers it with inimitable showmanship, casually firing off references to its literature in every European tongue. ("Don't cher know.") Chin in hand we lean forward anxious not to miss any of his cracks—and forget to take any notes. He is the only lecturer I know who can hold our interest for two consecutive hours and leave us looking forward to his next session. He takes us out on the parkland, surprises us with every variety of gas, and sprays us with oil. He inveigles us into sprinting down an avenue a hundred miles long in our respirators while concealed NCO's pelt us with fireworks. At the end of three days he takes wing to pitch his circus in another training school, but by then we have learned at least one lesson: "*Better the blistered living*"—he reminds us through his megaphone, and we chant back in unison—"*than the decontaminated dead.*"

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Letters to the Editor

NUTRITION SURVEYS

SIR,—Investigation on certain aspects of nutrition is, at present, handicapped by lack of coöperation. Investigators may be ignorant of other work, similar or related to their own; they may have difficulty in finding others who could coöperate in making their work complete; they may use different methods, the results of which are not comparable. The most striking example is that of estimations of hæmoglobin levels, which have been made by a variety of methods, some of which are by no means satisfactory. In this particular case the Medical Research Council has set up a committee with the object of coördinating surveys of hæmoglobin levels and some other blood examinations.

There remains, however, a wide field that is not covered by any existing organisation. In view of the importance, at the present time, of a thorough knowledge of the state of nutrition in the country, the Nutrition Society has set up a committee, with Sir Joseph Barcroft as chairman, the terms of reference of which are the coördination of nutrition surveys dependent on (*a*) clinical, physiological and biochemical examinations of human subjects; (*b*) examinations of food budgets; and (*c*) chemical analyses of food and meals (including collective meals). This Committee on Nutrition Surveys will put investigators in touch with others who are working on the same lines or would coöperate; it will supply information, recommend methods and make periodical summaries of the results of investigations. The committee has the support of the Ministries of Health and of Food and the coöperation of the Services. I have been appointed director, serving under the committee, and all who are engaged on or undertaking investigations covered by the terms of reference are invited to communicate with me.

London Hospital, Whitechapel, E.1. J. R. MARRACK.

EVALUATION OF GASTROSCOPY

SIR,—In his letter of April 10 Sir Henry Tidy raises some valuable points in connexion with my article. With regard to selection of cases, which I agree is essential, since indiscriminate gastroscopy is as much to be deprecated as indiscriminate radiology, increasing experience of gastroscopy in Service cases has made it possible to indicate the types of case in which gastroscopy has proved of value. This I endeavoured to do in the summary of my paper. Perhaps it should have been emphasised that the figure of 5·3% for ulcers referred only to gastric ulcers and did not include those situated in the duodenum: this incidence is essentially the same as that found in other series of Service dyspepsias. The 49% of cases of gastritis includes cases from other hospitals transferred specifically for gastroscopy, other investigations having proved negative or inconclusive. Sir Henry Tidy's second point—the recategorisation of the non-ulcer case—is in most respects outside my province, since I do no more than make general recommendations, not necessarily followed, the actual medical grade being decided by the medical board, but it has been my experience that many of these men have been placed in category B and not C, while others have not had their category changed at all. Unless already Y-listed on transfer here from other hospitals, these cases are always returned with medical category unaltered to their own units: Y-listed cases with or without preliminary recategorisation in hospital by medical board are posted to units by records.

Brigadier Harold Edwards takes me to task for making a too frequent diagnosis of gastritis, but such were the findings, made first on clinical grounds, often supported by radiological or other evidence, and finally confirmed so far as possible by gastroscopy, using the criteria laid down by Schindler. No doubt the percentage is affected because the cases are from a special centre, but it is certain that gastritis is a common disease, as has been shown by pathologists working on material collected at autopsy and at operation, while only very recently Schindler and Ortmayer have demonstrated the close correlation between gastroscopic and pathological findings. It is surprising that Brigadier Edwards should consider hypertrophic gastritis so rare, since, for example, it is known to be a not infrequent concomitant of peptic ulcer. I very much agree with his remarks concerning the terminology of atrophic gastritis and also in regard to those cases where more than one type of gastritis is found in the same patient, but, as he says, the division into types is arbitrary and a reasonable one until our knowledge increases. It was precisely because there are many who remain unconvinced of the value of gastroscopy in the assessment of the Service dyspeptic that I attempted to enumerate the types of case in which help could be obtained. To obtain the actual incidence of the various lesions would clearly require analysis of thousands of cases from many age-groups.

In his article on dyspepsia in the army, Lieut.-Colonel L. C. Hill rightly stresses the importance of rapid investigation, early decision as to disposal, and avoidance of repeated hospitalisation in the Service case, but his main argument against the special centre, that the functional dyspeptic is made worse by contact with the ulcer case, is invalid if, as here, the centre has three divisions, as advocated by Sir Arthur Hurst.

Newmarket. A. MORTON GILL.

SIR,—The introduction of X rays as a means of gastro-intestinal examination led to a striking increase in the number of cases where abdominal symptoms were attributed to the presence of "ptosis." Gastroptosis and coloptosis joined the ranks of the "dropped kidney" and surgeons were called upon to correct these "abnormalities"; often with disastrous results. With greater experience we now appreciate how wide are the variations of the normal, and operative treatment on the above lines has largely fallen into disuse.

A new field has been opened up by the introduction of gastroscopy. It seems probable that, here again, the possible variations of the normal have not yet been fully explored or understood by all gastroscopists. This would explain the extraordinary variation of results obtained in similar groups by different observers. The dangers of over-enthusiasm are so great that caution in the interpretation of results cannot be too strongly urged. It should be remembered that every patient in whom a diagnosis of gastritis has been made on insufficient grounds has his chances of recovery diminished as the result of the investigation.

Sevenoaks. JOHN VENABLES.

AVOIDANCE OF POSTPARTUM HÆMORRHAGE

SIR,—In your leading article of April 10 you rightly point out that the disasters accompanying manual removal of the placenta nearly all happen when the patient has been allowed to lose too much blood before the operation is undertaken. When there is excessive bleeding with the placenta still in utero you recommend that an attempt be first made to express the placenta by Credé's method—with which all will agree—but apparently without anæsthesia. In many cases this will prove successful, but in not a few it will fail because the operation cannot be properly carried out on account of the tightening of the abdominal muscles occasioned by the pain and perhaps also on account of the development of a constriction ring. Where Credé's method has been attempted and has failed, it is more than likely that a further bleeding will have been caused, amounting sometimes to quite a severe postpartum hæmorrhage.

I would recommend, therefore, that in every case the patient be given a general anæsthetic. The time while narcosis is being induced could be usefully employed scrubbing up again and thoroughly cleansing the vulva, including grasping the cord as close as possible to the vulva with sterile pressure-forceps and cutting away the cord distal to it. Catheterisation should be carried out if the bladder is not already empty. A sterile towel having been placed on the abdomen, Credé's method may now be employed and will prove quite easy in the great majority of cases. Any bleeding after expression of the placenta can be immediately and easily controlled by bimanual compression of the uterus until the uterus hardens in response to ergometrine given intravenously or intramuscularly; this is much simpler and safer than employing a hot intra-uterine douche. In the few cases where Credé's method fails the fact that the patient is already anæsthetised and aseptic precautions have

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already been taken allows one to proceed with manual removal of the placenta without a moment's delay, thus minimising blood loss.

I am convinced that by always employing anæsthesia failure to express the placenta by Credé's method and thus the necessity for manual removal of the placenta will be reduced to the absolute minimum. In the Aberdeen Maternity Hospital in the 5-year period 1938–42 manual removal of the placenta was necessary in only 9 cases out of over 6000 booked cases.

Aberdeen. J. F. B. WYPER.

TEMPERATURE TAKING

SIR,—Observations made in this hospital show that generally a maximum reading can only be assured when the thermometer is left in the mouth for at least six minutes, irrespective of the time stated on the thermometer or whether or not it is marked "NPL-tested." Six-minute thermometry should be a routine practice in hospitals, though it may be difficult to institute at the present time owing to the shortage of nursing staff. I believe I am correct in stating that ten-minute thermometry has long been the custom in the more efficient sanatoria when the reading is taken in the mouth.

S. LOCKET,
County Hospital, Pembury. Resident Medical Officer.

GASTRO-ENTERITIS IN HOT CLIMATES AT SEA

SIR,—Five years ago I published a paper on over a thousand cases of gastro-enteritis encountered in passenger liners at sea (*Lancet*, 1938, i, 1407), and divided them into three groups—sporadic cases arising on reaching a hot and humid climate (tropical diarrhœa); sporadic cases due to eating food or drinking water ashore; and acute epidemics presumably due to infection by the salmonella-dysentery group. It is with the first group that I wish to deal now. Various predisposing causes, such as chills, were suggested in my previous paper but were not thought to be the whole story, and all bacteriological investigations were negative. There was no article of food common to all patients and drinking-water could be acquitted of responsibility. Many authorities discussing tropical diarrhœa lay stress on the association of a high temperature with high relative humidity in causation.

The same kind of outbreaks of acute gastro-enteritis occur in troop transports in war, but cases are more numerous, even allowing for the much larger numbers carried, and begin slightly earlier, probably owing to the higher internal temperature of the ship due to blackout and to crowding of the troopdecks. It is surprising that I can find no reference to gastro-enteritis in transports during the last war, either in the British or Australian official medical histories. Observations on troops carried when the ship forms part of a convoy show that many, if not all, ships have troops affected in the same way to a greater or less extent, that the ships may have taken water at different ports and been victualled by different owners, and that cases may occur before the first port is reached. This seems to exclude food, water and a "carrier" food-handler. The possible immediate causes appear to be: (1) a virus, perhaps spread by droplet infection; or (2) climatic conditions favouring the development of pathogenic intestinal organisms, causing saprophytic organisms to become pathogenic, or lowering the patient's resistance. The second view is supported by the experiments of I. J. Kligler (*Trans. R. Soc. trop. Med. Hyg.* **29**, 531) and of E. C. Robertson and C. B. Weld (*Proc. Soc. exp. Biol. N.Y.* 1932, **30**, 33). There are many epidemics on land, reported by American, Canadian and British investigators, where a virus was believed to be responsible, but so far no outbreak has been proved to be due to virus infection.

The importance of this condition in troop transports is that morale is lowered and officers and men get panicky thinking that dysentery or cholera has broken out, that a few cases go on to a catarrhal appendicitis (which I have seen perforate), that men may be left with a chronic colitis and reach their units as liabilities instead of assets, and that, should the outbreak be due to a dysentery organism, carriers will be distributed to rest-camps and units on arrival and form potential foci for widespread infections. I would like to make two suggestions. The first is that SMOs and OC troops of transports be advised to warn their troops that cases may be expected on reaching a hot humid climate, and that, although there is nothing to be alarmed about, all cases should report to the MI room. The second is that a skilled bacteriologist be sent on a round voyage in a ship already equipped with incubator, media, microscope, &c. This would only entail allotting one officer berth, and the investigation might prove of great value.

H. M. ROYDS JONES,
Surgeon, Orient Steam Navigation.

MYTHOLOGY OF CANCER RESEARCH

A REPLY TO PROFESSOR KENNAWAY

W. C. HUEPER, M D KIEL

(*From the Warner Institute for Therapeutic Research, New York City*)

THE article with a challenging title by Prof. E. L. Kennaway in THE LANCET of Dec. 26, 1942, represents a critical dissection of some auxiliary evidence cited in my book (Hueper 1942) in support of the carcinogenic properties of arsenic. Both the substance as well as the interpretation and presentation of this evidence are the subject of attack.

Dr. Kennaway's first step in his mythological approach to the problem of arsenic cancer is an attempt to depict Dr. J. A. Paris as a sort of charlatan by quoting a few items from the index of his book *Pharmacologia*, in which the first information on industrial arsenic cancer in man and animals was published in 1820. The book is declared as "obsolete" and the information contained in it as "of little or no value." In support of this categorical assertion, some statements from an article of (Sir Henry) Butlin, who surveyed the situation in Cornwall 70 years later and who was unable to find at that time any cases of scrotal cancer among the tin smelters of this region, are quoted.

SCROTAL CANCER AMONG SMELTERS

Now let us look at the actual record. Dr. Paris, who practised for several years in Cornwall, evidently gave an eye-witness account when he noted the occurrence of scrotal cancers among the smelters. He supports the validity of his diagnosis, moreover, by the statement that these tumours are similar to those found in chimney-sweeps and implies that a man named Stahl made similar observations. Paris thus records his own observations, displays his familiarity with the kind of lesion described by comparing it with a well-recognised type of occupational cancer of the scrotum, and finally cites confirmatory circumstantial evidence by a second person. There is no obvious sound reason to doubt the correctness of his statements in this matter, even if his book contains other items which appear obsolete to our present generation. The intrinsic unfairness of such an approach to a man and his work is evident from the fact that with the same arbitrary reasoning the work of one of Paris's famous contemporaries, Rokitansky, could be declared as valueless as that of Paris because he held some conceptions which are no longer acceptable. This lack of proper scientific perspective and humility displayed by Dr. Kennaway becomes increasingly obvious if one considers the recognition which Paris's observation on arsenic cancer has found in general. Thus, Paris's book is prominently mentioned and a verbatim quotation of his statement on the arsenic hazard in Cornwall and Wales is published by Dr. Haagensen (1933) in his paper entitled "An Exhibit of Important Books, Papers, and Memorabilia illustrating the Evolution of the Knowledge of Cancer."

Concerning the value of the evidence provided by Butlin, who receives so much praise for his thorough and scientific efforts on behalf of the arsenic cancer situation in Cornwall and Wales, the following remarks may be appropriate. Butlin records mainly second-hand information, which is obtained moreover long after the period of Paris when (as Butlin's witnesses state) "there is but little arsenic now compared with what there was a few years ago" and "the smelting of tin is not now carried on to the same extent as formerly in that neighbourhood." This apparent reduction in the arsenic

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hazard in more recent times is of great importance in judging the value of the statements made by Butlin in regard to the occurrence of scrotal cancer, as it is a well-known fact that the occurrence of neoplasms in industry and under experimental conditions depends to a great extent upon the intensity of exposure to a carcinogenic agent. Dr. Kennaway has not paid any attention to this item in his argumentation against Paris's claims.

It may however be noted that, in spite of the apparent reduction in the activity of the smelters and in the amount of arsenic released into the atmosphere, Butlin reports Dr. Mudge as remembering "to have seen in past times eruptions and even rawness of the scrotum and insides of the thighs of the men exposed to the fumes of arsenic, but he had never seen a case of cancer of the scrotum, although he had seen several cases of cancer of the penis." It is not mentioned whether or not the diagnosis of the scrotal and penile conditions was based on more than clinical diagnosis. This point is raised, because Dr. Kennaway stated that "there is nothing to show the cancerous nature of the alleged tumours" (reported by Dr. Paris)—i.e., there was no histological examination made.

Thus, Butlin's evidence establishes again the existence of an arsenic hazard from industrial fumes in the region of the tin smelters, and the occurrence of arsenical scrotal irritations of undetermined nature. If viewed without prejudice and perversion, the data of Paris and Butlin are not contradictory, as suggested by Dr. Kennaway, but are in many respects in harmony, while their differences are plausibly explained by the changes which took place in the operation of the smelters during more recent times.

In commenting upon the observations of Paris in regard to scrotal cancer I stated in my book that "Paris noticed the high incidence of cutaneous malignancy among the men employed in these factories." Dr. Kennaway calls this "a somewhat highly coloured and extended version of Paris's simple statement." Inasmuch as I placed a verbatim quotation of the statement of Paris on this subject directly after my comment, it is apparent that there can be no question of colouring or extending any evidence, as Dr. Kennaway insists. My comment is addressed to those readers who are less familiar with the subject of scrotal cancer than is Dr. Kennaway. It is a well-established fact that scrotal cancer is one of the rarer types of malignancies found in the general population. I may cite in support of this contention three of Dr. Kennaway's star-witnesses—Hutchinson, Butlin and Erskine—who stated, according to Butlin, that they do not remember "to have met with a case of cancer of the scrotum in the whole course of their experience" (10 to 30 years). It is obvious that if Paris observed, during 4 to 5 years of practice in Cornwall, the occasional occurrence of scrotal cancer among the smelters he saw at least several cases among a relatively small group of specialised workers. The use of the term "high incidence" in a comparative sense appears to be justified in this connexion, as it is accepted usage when referring to the frequency of this type of neoplasm in chimney-sweeps, mule spinners, pitch and tar workers. In all these instances only a relatively small percentage of the members of the occupational groups mentioned acquire this neoplasia.

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A similar tendency toward fault finding is revealed by Dr. Kennaway when he calls my description of the type of exposure which produced the manifestations of chronic arsenicism in horses and cows, noted by Paris, a "picturesque addition about the grass of the meadows and the grazing animals" which adds "nothing whatever to the very questionable value of Dr. Paris's story." Again, this commentary was added for the benefit of those readers who are not acquainted with the toxicological aspects of arsenicism caused by contact with contaminated vegetation. Oral ingestion of arsenic is not only the prevalent mechanism through which arsenical insecticides and parasiticides act, but it is also the most frequent type of arsenical introduction seen in connexion with therapeutic, industrial and environmental arsenic cancer. It may be granted that, under the conditions present in Cornwall, cutaneous and respiratory contact were simultaneously operative to only a limited degree as far as the animals were concerned. The mythological colouring matter in this instance exists exclusively in the mind of Dr. Kennaway.

ARSENIC CANCER IN DEER

Against my abbreviated version of the paper of Prell on the occurrence of chronic arsenic damage among the wild animals in the forest of Tharandt and among the domestic animals of this region Dr. Kennaway offers the following continuation of his research in mythology. He contends that "Prell makes no mention whatever of any hyperkeratoses in horses, cows, goats or pigs, nor of any 'extraordinary mortality among insects' other than bees, apart from a bare statement of a mortality among silkworms," which I had done, and that I chose "to describe the warts in deer as 'precancerous,'" while Prell was put down as not having said so. Dr. Kennaway then proceeds to assert that "anyone who reads the actual papers of Prell and Hofmann must surely be struck by one view of the matter which is the reverse of that advocated by Hueper."

The accumulation of this long list of accusations must have taken a great deal of time and manipulation. In commenting on Prell's paper I mentioned a report of Dr. Baader, director of the Hospital for Occupational Diseases in Berlin, who discusses rather extensively in his paper on industrial cancer a presentation of Dr. Prell given before the Congress of German Naturalists and Physicians in Dresden in 1936 and dealing with the same material published later in the *Archiv fur Gewerbepathologie*. It is obvious from the abstract furnished by Dr. Baader that a somewhat modified version of the published paper was given on that occasion. As the data contained in this abstract furnished a part of the condensation contained in the book, I shall quote some parts of Baader's report:

"Die krebsigen Hufgeschwüre bei Pferden in Arsenschmelzereien sind von jeher bekannt. Ausserordentlich bedeutsam aber sind die jüngst auf der Naturforscher- und Ärztetagung Oktober 1936 in Dresden von Prof. Prell, dem Leiter des Zoologischen Instituts der Forsthochschule Tharandt wiedergegebenen Beobachtungen über umfangreichste Arsenschädigung der Tierwelt durch Industrieabgase. . . . So haben die arsenhaltigen Fluggase der Abgasschwaden dieser Hüttenwerke über 2800 Bienenvölker vernichtet und zahlreiche akute und chronische Arsenvergiftungen unter dem Wild, den Haustieren, Pferden, Kühen, Schweinen verursacht mit Haarverlust und Hyperkeratosen, in mehreren Fällen an den Läufen der Hirsche Arsenwarzen als präkanzeröse Stadien. . . . Im übrigen zeigt dieses Massenexperiment am Tier in freier Wildbahn und beim Haustier, wie relative geringe Arsenmengen genügen, um schwere Arsenschädigungen bzw. Arsenkrebse zu setzen und führen zu Vergleichen mit den bislang viel zu wenig beachteten geringen Arsenmengen, mit denen zahlreiche Volksgenossen in ihrem Beruf ständig zu tun haben. . . ."

I may add that Dr. Baader's work and position bring him in close contact with hazards of this nature, and he must be regarded as a competent observer and authority in the field of industrial medicine. I am sure that a comparison of my version with that of Dr. Baader and the original one of Dr. Prell does not reveal any fundamental discrepancies which can be regarded as "colouring the evidence of a first-hand observer." Moreover, one is struck by the audacity of Dr. Kennaway to contend that the views of Drs. Prell and Hofmann are the reverse of my view. One must wonder if Dr. Kennaway has read the actual papers of these authors with the proper understanding and freedom from prejudice. There is no doubt in the mind of Dr. Prell that the manifestations observed in the wild and domestic animals are attributable to arsenic; Dr. Hofmann emphasises the similarity of the anatomic lesions with those seen in the gastrointestinal form of arsenic poisoning. While Dr. Hofmann does not make special mention that the cutaneous carcinoma found in a deer is of arsenical genesis, the entire evidence presented by him and Dr. Prell leaves no reasonable doubt in this respect, unless one deliberately chooses to use standards of judgment not ordinarily applied in the recognition of tumours of environmental, occupational and medicinal nature.

It seems that Dr. Kennaway's conclusion was rather hasty when he states that the "absence of malignant growths in cattle, and the yield of one single cancer from

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the examination of 143 deer and 27 hares exposed to arsenic, surely amounts to evidence against, rather than for, the carcinogenic action of arsenic in these animals, of whom presumably a few at any rate live long enough for the development of malignant growth." His claim completely disregards the analogous conditions present in this direction in connexion with arsenic cancer in man. He takes no notice, moreover, of a statement of Dr. Prell that the publications of Haubner in 1878 and of Wobst in 1925 on arsenicism among the animals in the Freiberg district are either almost forgotten or that no practical consequences have been drawn from them.

CARCINOMA OF THE NASAL MUCOUS MEMBRANE IN SHEEP

Dr. Kennaway then proceeds with his third indulgence in mythology by calling my version of Nieberle's paper on the occurrence of endemic cancer of the ethmoid cells among sheep kept in the same general region (Freiberg) from which Dr. Prell reported "either wholly misleading or false, in every single particular." The facts are as follows:

1. Nieberle was well aware that the estate on which the diseased animals were kept was within the zone of potential danger, as he not only noted that it was situated in the remoter neighbourhood of the Freiberg smelting works, but he saw to it that the organs of the dead sheep were examined for arsenic. To contend, therefore, that the phrase of Nieberle "remoter neighbourhood" is non-commital, while mine "within the fume and dust zone" is "wholly misleading" is at best an arbitrary judgment chosen apparently to fit the occasion.

2. The chemical analyses of the organs demonstrated that an actual arsenic hazard existed. That this hazard was inconsiderable, according to the chemical data, is beside the point, and I have not made in the few words which I devote to Nieberle's article any statement in this respect. It is, however, questionable whether such a conclusion can be drawn from a few chemical analyses.

3. Nieberle considers three ætiologic possibilities—parasitic, hereditary, and arsenical. He completely discards the first one, mentions the second briefly, and ends by stating that the cause of the disease is connected with the locality and that arsenical injury can scarcely be excluded. It is evident from the relatively large amount of consideration which Nieberle gives to the latter factor—as apparent from his mention of the arsenical hazard to animals in the Freiberg region, the location of the Limbach estate in this district, the demonstration of arsenic in the organs of the diseased sheep—that an arsenical ætiology appears suggestive to him. My statement that "he suggested that this condition was caused by the chronic introduction of arsenic . . ." expresses therefore only in a modified phrase what Nieberle implied in his own words.

4. On only one point can Dr. Kennaway's contentions be sustained. Through a mistake in transcribing one of the many hundreds of abstract cards used in the preparation of the book the mention of the cattle in connexion with the gastro-intestinal manifestations was omitted and through this deplorable mistake a garbled version of Nieberle's paper produced. However, I am certain that such unintended inaccuracies may occur even to the best of authors when confronted with an almost overwhelming number of abstracts. How easily such minor errors may creep in is demonstrated by the fact that Dr. Kennaway notes the occurrence of ethmoid cancers in ten sheep within a few months, while Nieberle rather clearly mentions a total of 15 cases. It is obvious that neither one of these errors changes fundamentally the substance or the interpretation of the evidence presented by Nieberle.

It may be pointed out that the occurrence of arsenic cancer of internal mucous membranes as suggested by Nieberle's observations is not unique, as similar evidence has been reported in connexion with industrial and therapeutic arsenic cancer in man. The coexistence or successive existence of multiple cutaneous arsenical cancers and dermatoses with papillomas or carcinomas of the lung, ureter, bladder and urethra were recorded by Goeckermann and Wilhelm (1940), Montgomery and Waisman (1941) and Bridge (1941).

(*References at foot of next column*)

Obituary

SIDNEY FRANCIS ST. JERMAIN STEADMAN

MRCS, LDS, DPH

As senior dental surgeon at the Royal Dental Hospital and recognised teacher in dental surgery in the University of London, Dr. Steadman, who died on April 11, had been for many years a contributor to his science, and a leader among his colleagues.

He was born at Kingston-on-Thames in 1880, the son of a solicitor, Mr. Sidney St. J. Steadman. Educated at Dulwich College, the Royal Dental Hospital and Charing Cross Hospital, he qualified as LDS in 1902, and took his MRCS, LRCP in 1907 and the DPH in 1911. From 1910 to 1914 he was dental surgeon to the Metropolitan Hospital and to the Belgrave Hospital for Children; and he lectured in dental histology and dental surgery at the National Dental Hospital until 1914. During the last European war he became a major in the RAMC and was with the 60th division in France, Palestine and Salonika, and DADMS to the 20th Corps. Afterwards he returned to London, and from 1926 to 1929 taught bacteriology at the university, where he was a member of the faculty of medicine. He was also consulting dental surgeon to the West London Hospital, and lecturer in dental surgery at the postgraduate college. He examined in dental surgery from 1930 to 1933 at London University, and in orthodontics from 1935 onwards, and he was also an examiner at Bristol University for a time. His interest in orthodontics was keen, and he was president of the British Society for the Study of Orthodontics in 1937. In 1939–40 he was a vice-president of the Royal Society of Medicine and he was president of the section of odontology in the same year. He was a member of the representative board of the British Dental Association and president of the metropolitan branch in 1932. A friend writes of him:

I first met Frank Steadman immediately before the outbreak of the Great War in 1914 when we were candidates for appointment to the honorary staff of the Royal Dental Hospital. He was elected on that occasion and thus began a close association which remained unbroken, excepting for the war years, and furnished many opportunities for the study of a personality which, if only superficially examined, was very likely to be misjudged. Forceful and impetuous at times, he was withal courageous in upholding what he believed to be right, and when differences of opinion arose, as was inevitable with such a character, he never stooped to taking any unfair advantage of his opponent, but on the contrary frequently provided the means of bringing about a modification of his own views. He was greatly interested in the problems of the relationship between dental and general disease, and did much by his writings and teaching to further this aspect of dentistry. Steadman's service to his hospital was unstinted, and although his term of office expired early in this war he immediately placed his services at the disposal of the board which gratefully accepted them. An enthusiastic and regular attendance at committees made him a potent factor in the shaping of policy, and his ready help will be missed. This sense of loss will be shared, I am sure, by the many students all over the world whose welfare he had so much at heart. His name is so closely bound up with dentistry that it is not generally known that he possessed authoritative knowledge of archæology and anthropology, subjects to which his interest turned when he was a student at Charing Cross Hospital.

During this war he gladly undertook the work of lecturers called away into the Services. He wrote books on local anæsthesia in dental surgery, bacteriology for dental students, and pyorrhœa alveolaris as a predisposing cause of cancer, and among his other published works

DR. HUEPER: REFERENCES

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are papers on the technique of surgical operations in the mouth, fractures of the jaw and pathology of cancer of the tongue. In 1907 he married Grace, daughter of F. W. Hamilton. He leaves two sons and one daughter.

Flying-Officer HAROLD PATTERSON HALL, LRCPE, was killed in a flying accident on March 12. He was twenty-eight years of age and qualified from the University of Durham in 1941. After holding a house-appointment at Cherry Knowle Mental Hospital he was appointed to a commission in the RAF Medical Branch last year. At the time of his death he was medical officer to a fighter squadron.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE Budget statement has been made, no unexpected burdens are imposed and the fear of possible further increase in income tax has been removed. The total budget for 1943 is £5756 million and overseas disinvestment will provide £600 million. We have therefore to provide at home for a budget of £5156 million. It is estimated that personal savings will still further increase and reach £1300 million and that domestic borrowing as a whole will reach £2250 million. This means an increase of taxation for the year to about £2900 million, of which £175 million is new. This sum is partly met by estimated increases on existing taxes and duties, leaving about £100 million to be provided from new sources. It is this £100 million we are paying for in increased beer, wine, spirits and tobacco duties, in the extra entertainment tax and luxury taxes now up to 100%. There are some remissions—certain utility goods are to be free of purchase tax and certain allowances are made for dependent relatives and housekeepers. As the Chancellor of the Exchequer claimed, it is a budget on an even keel. Our ship of state is not only soundly and strongly constituted but richly laden. The immense resources of man-power and materials at our disposal and the sound financial system which enable us to carry on successfully also enable us to maintain the armies of the sea, the land and the air and the armies of the factory, the field and the home at a good standard of living and a high standard of efficiency.

It should not be forgotten, and the Chancellor gave it place of honour in his general review, that in this war we have the backing of American lend-lease. The institution of this system of international reciprocal aid by President Roosevelt is one of the most far-reaching acts of the war. It rests on the principle that in a common war all shall give all they can to the common cause without reckoning mutual financial indebtedness. Of the goods and services which the USA supplies to this country, to Russia, China and other members of the United Nations, 80% are on lend-lease terms. We on our side are applying the lend-lease principle to all munitions and services, including shipping, which we furnish our allies. But the plan is not intended to lend itself to close accounting. You cannot bring the victory of the convoy to Malta or to Murmansk or the defence and victory of Stalingrad into a balance sheet. The balance can only be a world balance, and the Chancellor told us that great as was the help we were getting from the United States, it was no greater than we ourselves are giving to all our Allies (including the United States) without charge.

Looking for a moment toward the future with the immense problems of rebuilding a war-shattered world, Sir Kingsley Wood quoted Robert Hamilton in another grim period of English history in 1814: "No exertion can be too great, no pressure of increasing burthens is to be regarded, no dread of exhausting our resources entertained."

NURSES BILL IN THE LORDS

DURING the brief second-reading debate in the Upper House on April 13, Lord HORDER assured the House that the bill had the sympathetic ear of the medical profession. He had authority to say that the nursing profession would welcome its passage into law, together with the valuable economic adjustments recommended by the Rushcliffe Committee. These two things taken together would raise the status of nursing in this country as nothing had so far done. In framing the bill the Minister of Health had followed on broad lines the recommendations of the Athlone Committee and of the nursing reconstruction committee under the ægis of the Royal College of Nursing, over which he had himself presided. But the Minister's courage forsook him when he came to deal with one of that committee's suggestions for the protection of the patient—namely, that in the interest of the patient at a time when he was in no condition to protect himself, and also of the nurse, it was reasonable that the profession should be closed to everyone except three grades of person: the State-registered nurse, the assistant nurse (enrolled as she must be) and the student nurse. No woman or man outside those categories should be allowed to exploit the sick person. When the bill reached the committee stage he would move an amendment tightening up the bill in the public interest.

QUESTION TIME

Minister's Statement of Health Proposals

Mr. SORENSEN asked the Minister of Health when his plans for a comprehensive medical and health service were likely to be brought before the House; whether he was receiving advice and information and taking evidence in preparation for this; and whether it would include the mental hospital and mental deficiency services.—Mr. E. BROWN replied: Preliminary discussions are now taking place with representatives of the medical profession, the local authorities and the voluntary hospitals. I contemplate publishing in advance of the introduction of legislation and, I hope, in the course of the next two or three months a general statement of my proposals which will afford all concerned an opportunity of considering and criticising them. The answer to the last part of the question is No.

Supply of Penicillin

Replying to a question the Minister of Supply said that the first meeting of the committee set up to report on penicillin and to conduct clinical trials thereon was held on Oct. 13, 1942. The object of the committee was to secure that all available information regarding clinical and chemical trials and methods of production was collected and exchanged and that everything possible was done to promote the most rapid development. The following were the members: Mr. Arthur Mortimer, deputy director of medical supplies, Ministry of Supply (chairman); Prof. Alexander Fleming, St. Mary's Hospital; Prof. H. W. Florey, school of pathology, University of Oxford; Prof. Harold Raistrick, London School of Hygiene; Sir Robert Robinson, DSc, ScD, Dyson Perrins Laboratory, University of Oxford; Prof. C. R. Harington, DSc, and Dr. A. N. Drury, Medical Research Council; Dr. V. D. Allison, Ministry of Health; Prof. I. M. Heilbron, DSc, University of Cambridge; Lieut.-Colonel Sir Russell Wilkinson, military medical adviser, Ministry of Supply; together with representatives of firms engaged in production of penicillin.

Allocation of Nurses and Midwives

Sir A. BAILLIE asked the Minister of Labour whether he would ensure that newly qualified nurses who were also qualified midwives should be free to practise either general nursing or midwifery at their option and should not be directed into midwifery against their will.—Mr. E. BEVIN replied: I can give no such assurance, since it is essential that nurses and midwives should be employed where they are most needed. In taking action to meet the problem of distribution, I propose to obtain the advice of the National Advisory Council, in which nurses and midwives are adequately represented. I would naturally wish to consider the desire of any individual nurse or midwife.

Appointments

POLLEY, S. F., MRCS, DA: resident anæsthetist at Kingston County Hospital.

RUBINSTEIN, L. H., MD FLORENCE & VIENNA, DPM: temp. psychiatrist to the Derby child guidance clinic and Chesterfield children's centre.

WALLACE, E. D. M., MB EDIN, DPH: examining factory surgeon for Perth.

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Notes and News

HOME-MADE INSULIN

LIVES of diabetics in an invaded state may hang on the courtesy of the occupying army. When the Japanese took Shanghai they seized all stocks which seemed likely to be useful, leaving the supply of insulin dangerously low for the 500 or so diabetics who were depending on it. A Glasgow chemist, Mr. A. N. Walker, whose own work has disappeared (he was a member of the ICI staff in China) offered his help to the public health department of the Shanghai municipal council. It was clear that the manufacture of insulin was the first problem: and the responsibility for providing it was given to Walker. The technical difficulties were formidable, and there was a chance that if the Japanese found out what was going on they might punish the workers. Moreover, though he held a first-class honours degree in chemistry, he had specialised for six years in the finishing of textiles and leather, and he had had no experience at all of the branch of biochemistry he was now to attempt. The work had to be done in the public analyst's laboratory without centrifuges or filter-presses (he used muslin bags like a housewife making jelly), without vacuum pans (he used big glass bottles), and with no help other than that of Chinese coolies. But after studying volume 10 of *Reports of Connaught Laboratories, Toronto* (where there was an article by Scott, Fisher, and Best) he set to work.

He bribed the Chinese meat inspector to divert several pounds of ox pancreas to him daily; that was dangerous, because the Japanese had commandeered nearly all the beef. The alcoholic extract from 70 lb. of pancreas had to be concentrated from 80 litres down to 7, keeping the temperature below 25° C. to avoid decomposition of the insulin. Since the alcohol came from stocks known to the Japanese it had to be recovered efficiently, and to prevent it from carrying over as vapour, the vacuum pumps had to be stripped several times a day, cleaned thoroughly and charged with fresh oil. After he and his coolies had worked for ten hours a day for ten weeks, his alcoholic concentrate was ready; but in order to precipitate the active insulin the solution had to be adjusted to pH 5, the iso-electric point, and this required a potentiometer. All British and American equipment having been commandeered, he appealed to the German medical school and the Herr Direktor lent him one. Walker finished the job, and saw insulin crystals of his own making under the microscope.

He sent a sterile solution to a biologist for approval and standardisation. All had gone well: his work had yielded 25,000 international units of insulin. But the biologist, a Korean with Japanese sympathies, carried the story to the enemy; and an anxious time followed for the adventurous workers in the public analyst's lab. The Japanese, after consulting Tokio about the odd affair, finally gave permission for the manufacture of insulin to proceed provided they got a large proportion of all future output. Then Walker, collaborating with the municipal engineers, designed improvements for his Heath-Robinson plant; and before he was repatriated from Shanghai he was satisfied that the future manufacture of insulin will be sufficient to meet all local needs as long as the war lasts.

PROSPECTS OF THE DISTRICT NURSE

IN response to the inquiries of those interested in district nursing, and more especially as a contribution to Medical Planning Research, a group of secretaries of District Nursing Associations have prepared a booklet [1] reviewing this subject and the kindred topics of the midwifery and health visitor services. An appendix compares the English system with that practised in Canada. This analysis presents objectively the facts about the training, prospects and life of district nurses. Their duties make great calls on their tact, skill, and resource; their training is long and often so poorly subsidised that they must work for several years on bare pocket-money and pledge themselves to serve in one place for a time after qualifying. Financial prospects are meagre and pensions are not freely interchangeable between authorities. Hours are long and responsibility considerable.

The Queen's Institute nurse holds her general state-registration certificate and must in addition take a six-months' training in public health nursing at a home approved by the institute. If she is to work in an area where midwifery is undertaken she must also hold the CMB certificate; and many Queen's nurses hold a health visitor's certificate as well. Such women are among the most highly qualified in nursing today, and may have spent as much as 5½ years in training. Their rewards are poor not only because nursing has always been poorly paid (and even the Rushcliffe report has not brought it into the ranks of well-paid occupations), but because the finances of the district nursing service are precariously founded partly on voluntary support, partly on fees paid by local authorities for services rendered (which vary widely in different districts); and partly on patients' provident and contributory schemes.

The authors of the booklet suggest that a national body should be set up under the QIDNA to formulate a contributory scheme which would provide uniform district nursing care for the whole country. The booklet is intended primarily for private circulation but its interest should command a wide public among those anxious to see the nursing profession set soundly on its feet.

1. The Domiciliary Nursing Service. Published for the Queen's Institute of District Nursing by Taylor and Bloxham Ltd., 96, Highcross Street, Leicester. 1s. 6d., plus postage.

Infectious Disease in England and Wales

WEEK ENDED APRIL 10

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1993; whooping-cough, 1954; diphtheria, 729; paratyphoid, 3; typhoid, 6; measles (excluding rubella), 18,056; pneumonia (primary or influenzal), 1290; puerperal pyrexia, 173; cerebrospinal fever, 92; poliomyelitis, 4; polio-encephalitis, 2; encephalitis lethargica, 1; dysentery, 116; ophthalmia neonatorum, 74. No case of cholera, plague or typhus fever was notified during the week.

Deaths.—In 126 great towns there were 1 (1) death from an enteric fever, 2 (1) from scarlet fever, 21 (2) from measles, 19 (5) from whooping-cough, 13 (0) from diphtheria, 58 (11) from diarrhœa and enteritis under two years, and 62 (4) from influenza. The figures in parentheses are those for London itself.

Birmingham had 6 fatal cases of diarrhœa. Sheffield reported 4 deaths from influenza.

The number of stillbirths notified during the week was 236 (corresponding to a rate of 34 per thousand total births), including 23 in London.

Births, Marriages and Deaths

BIRTHS

BRAITHWAITE.—On April 5, at Egremont, Cumberland, the wife of Captain Edward Braithwaite, RAMC—a daughter.

CLARKE.—On April 13, at Bognor, the wife of Captain E. P. Clarke, RAMC—a son.

MACFADYEN.—On April 12, at Blackpool, the wife of Captain W. A. L. MacFadyen, RAMC—a daughter.

THOMSON.—On April 13, at Manchester, the wife of Dr. M. L. Thomson—a daughter.

MARRIAGES

DAY—EDMUNDSON.—On April 13, at Oxford, George Harold Day, MD, lieutenant RAMC, of the Mundesley Sanatorium, to Phyllis Eveline Edmundson.

GREENFIELD-DUANE.—On April 3, at Chalfont St. Peter, Archibald David Mant Greenfield, MB, to Margaret Duane, SRN.

LEESON-MACKAY.—On April 6, Clifford A. Leeson, MRCS, to D. Jean Mackay, MB.

RITCHIE—PRICE.—On April 8, at Oxford, James Alan Ritchie, BM, to Joan Price.

TITCOMBE—BEITH.—On April 10, at Manchester, Donald Macalister Titcombe, surgeon lieutenant RNVR, to Julia Robson Beith, ATS.

WILSON—WOODS.—On March 3, at Sialkot, India, Robert Baird Wilson, captain RAMC, to Barbara Alexander Woods, CSMMG.

DEATHS

CROLY.—On April 13, William Henry Croly, LRCPI, of Burnham, Bucks, and Rathfarnham, co. Dublin.

HAWKINS.—On April 10, Frederick Daly Cæsar Hawkins, MRCS, lieut.-colonel IMS, retd., of Eastbourne.

MIDDLETON.—On April 11, at Harborne, Lucas Alfred Middleton, LRCPI.

MURDOCH.—On April 10, at Bexhill-on-Sea, Andrew Murdoch, MB GLASG., aged 80.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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MORTALITY OF MEN
BETWEEN THE AGES OF 50 AND 65

PERCY STOCKS, M D CAMB, D P H
MEDICAL STATISTICAL OFFICER IN THE GENERAL REGISTER OFFICE

IN a recent paper on the war and the problem of ageing Korenchevsky [1] has pointed out that, since the professional man does not in most instances reach a position of high responsibility, or one in which his abilities are given full scope, before the age of 50, the physiology and pathology of ageing in mid-life may be an important factor in total war. It will be shown below that this conclusion finds support from a study of the death-rates of men between the ages of 50 and 65, which have presented some unsatisfactory features in recent years. Much attention is being devoted, and rightly, to the health of children and young people, but there is a danger of forgetting that considerable burdens are being carried by men over 50 and that the maintenance of their health is also a vital factor in winning the war and the peace to follow it. The accumulated experience of a professional man or administrator is a national asset which cannot be replaced quickly, and at present men between 50 and 65 form a substantial proportion of the workers in many essential industries.

It was pointed out in the Registrar-General's Statistical Review for 1937 [2] that the improvement in death-rates of men over 45 was not keeping pace with that of women of the same ages, and the rates in the review for 1939 [3] again showed that at the age-group 55–65 among men little or no progress was being made. Perhaps the simplest way to draw attention to this is to compare the recent trends in the expectations of dying: (*a*) before 50 for a man aged 25; (*b*) before 65 for a man aged 50; and (*c*) before 65 for a woman aged 50. Table I is based on the death-rates at various dates since 1891–1900.

TABLE I

Years on whose death-rates the expectation is based		Number, out of 1000 attaining the first age, who were expected to: Survive to second age	Die before second age	Fall (since date preceding) in deaths expected out of 1000	Rate of fall every 5 years (%)
(*a*) Males 25–50	1891–1900	765	235	..	..
	1901–1910	804	196	39	9
	1910–1912	826	174	22	11
	1920–1922	851	149	25	7
	1930–1932	871	129	20	7
	1937–1939	889	111	18	10
(*b*) Males 50–65	1891–1900	626	374	..	..
	1901–1910	656	344	30	4
	1910–1912	677	323	21	5
	1920–1922	719	281	42	7
	1930–1932	734	266	15	3
	1937–1939	734	266	0	0
(*c*) Females 50–65	1891–1900	686	314	..	..
	1901–1910	722	278	36	6
	1910–1912	743	257	21	7
	1920–1922	782	218	39	8
	1930–1932	798	202	16	4
	1937–1939	814	186	16	6

During the 20 years before 1911 the expectation at 25 of dying before 50 was falling for men at the rate of about 10% every five years; and the expectation at 50 of dying before 65 was falling at the rate of about 5% every five years. During the next two decades the rate of fall in the mortality expectation at 25 was reduced to 7% every five years, but during the period before the war it increased again to 10% every five years. In contrast with this, the expectation at 50 of dying before 65, for men, fell more slowly after 1922 and did not change at all in the period from 1930–32 to 1937–39, being slightly over 1 in 4 at both dates. For women attaining 50 the expectation of dying before 65 fell at the rate of about 7% every five years during the period before 1922, and was still falling by 6% per five years between 1930–32 and 1937–39.

1. Korenchevsky, V. *Ann. Eugen., Camb.* 1942, 11, 315.
2. Text, table XXIX and p. 61.
3. Part I, table 5.

The death-rates of males and of females at ages 50–55 and 55–65 per 100,000 living, from all causes except civilian war casualties, are given below for the periods 1921–23, 1930–32, and each year from 1938 to 1941.

		1921–23	*1930–32*	*1938*	*1939*	*1940*	*1941*
Males	50–55	1352	1308	1254	1283	1447	1257
	55–65	2489	2355	2308	2426	2747	2429
Females	50–55	1051	948	831	845	901	805
	55–65	1871	1724	1550	1574	1704	1489

The year 1940 was unfavourable at most ages, owing to the severe winter and other causes, and comparison can best be made by expressing 1939 and 1941 mortality in terms of the 1930–32 level taken as 100, which gives:—

Males { 50–55 .. 98, 96 | 55–65 .. 103, 103 } Females { 50–55 .. 89, 85 | 55–65 .. 91, 86 }

The question arises, what were the causes of death responsible for the failure of the male death-rates to improve between 1931 and 1941 in conformity with those of females at the same ages and of both sexes at younger ages? Remembering editorial criticisms of the civil servant's passion for tabular statements, I will endeavour to answer this without resort to a table of death-rates by giving at each age-group and for each of the important causes the rates in the six periods used above—namely, 1921–23, 1930–32, 1938, 1939, 1940 and 1941, all corrected to conform with the classification in force since 1940.

Ages 50–55.—Tuberculosis 160, 149, 127, 129, 141, 136; syphilis and its sequelæ 40, 37, 29, 29, 27, 25; cancer 216, 206, 209, 217, 218, 217; respiratory disease and influenza 352, 291, 254, 234, 345, 236; cerebral vascular lesions and arteriosclerosis 104, 75, 80, 86, 82, 77; nephritis 69, 67, 51, 48, 46, 41; heart diseases 157, 198, 231, 256, 278, 238; digestive diseases 91, 98, 101, 92, 97, 87; accidents 58, 53, 49, 67, 76, 73; other causes except war injuries 105, 134, 123, 125, 137, 126.

Ages 55–65.—Tuberculosis 149, 121, 114, 124, 136, 132; syphilis and its sequelæ 46, 48, 42, 41, 38, 39; cancer 474, 461, 461, 456, 465, 464; respiratory disease and influenza 657, 443, 366, 387, 606, 435; cerebral vascular lesions and arteriosclerosis 300, 240, 235, 256, 263, 238; nephritis 122, 118, 85, 80, 84, 78; heart diseases 355, 462, 549, 597, 648, 571; digestive diseases 139, 141, 138, 139, 146, 140; accidents 74, 70, 62, 91, 104, 99; other causes except war injuries 177, 251, 256, 255, 257, 231.

Tuberculosis-rates were falling until 1938, retrogressed in the next two years but began to recover in 1941, although the recovery was only sufficient in that year to bring back the rate at 55–65 to the level of about 15 years before. Syphilis- and nephritis-rates have continued to improve almost undisturbed by the war. The cancer-rate increased slightly between 1931 and 1939 at 50–55 but remained almost stationary at ages 55–65. Respiratory disease and influenza-rates declined in the prewar period, rose sharply in 1940 but recovered completely (50–55) or almost completely (55–65) in 1941. Cerebral hæmorrhage and arteriosclerosis-rates changed little from 1931 to 1938, rose temporarily in 1939–40 and recovered in 1941. Digestive disease mortality has changed little since 1931. Accident fatalities rose considerably in 1939 and again in 1940.

For heart diseases, however, the total death-rate showed a steady increase from 1921 to 1940 in each age-group, followed by recovery almost to 1938 levels in 1941. Analysing the group into four components and comparing with the aggregate of all causes other than heart disease, accidents and war injuries, the trend of rates has been as shown in table II.

The increase has been confined to coronary disease, angina pectoris and diseases of the myocardium, the combined rate for these having risen among men of 50–65 by about 70% from 1930–32 to 1939. Among women of the same ages the corresponding increase in this period was 30%. Chronic valvular and other heart disease declined in both sexes as certified causes of death, as did nephritis, and it is probable that changing fashions in death-certification have produced some transfer of deaths from these causes to the degenerative heart-disease groups. But even if as much as two-thirds of the decrease in valvular, other heart-disease and nephritis death-rates has been due to such transfer (which would account for the whole of the 30% increase in the degenera-

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TABLE II

—	1921–23	1930–32	1938	1939	1940	1941
Ages 50–55						
Chronic valvular affections	80	68	50	57	60	52
Coronary disease, angina	9	35	70	87	89	81
Diseases of myocardium	31	73	94	95	109	89
Other heart disease	37	22	17	17	20	16
All causes except heart disease, accident and war	1137	1057	974	960	1093	945
Ages 55–65						
Chronic valvular affections	167	144	91	95	103	91
Coronary disease, angina	20	74	161	186	186	176
Diseases of myocardium	79	198	262	282	323	273
Other heart disease	89	46	35	34	36	31
All causes except heart disease, accident and war	2060	1823	1697	1738	1995	1759

tive group among women), there still remains a 50% increase since 1930–32 in the degenerative heart-disease rates among men aged 50–65, or an excess of about 3300 deaths annually. The size of the problem is similar, therefore, to those of diphtheria, tuberculosis, prematurity and road accidents, which are receiving special attention at the present time.

We do not know what classes of men are most affected, but it was shown in the Registrar-General's Occupational Mortality Report for 1930–32[4] that while coronary disease and angina pectoris were much more often certified as causes of death among men in professional and sedentary occupations and myocardial disease more often among men in manual occupations, the combined death-rate did not at that time vary greatly with social class among men, the standardised ratios at 35–65 in social classes I–V being 118, 106, 95, 95, 108.

The purpose of this note is to call attention to the facts rather than to suggest underlying causes, but it may be pertinent to recall that men of the ages concerned in 1939 were between the ages of 25 and 44 during the war of 1914–18 and that many of them were then exposed to considerable hardships.

IMPETIGO CONTAGIOSA

ITS CAUSE AND TREATMENT

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THE name impetigo contagiosa has been applied to a variety of skin diseases. We accept Sutton's definition of it as a "disease characterised by the occurrence of discrete thin-walled vesicles and bullæ which dry to form yellowish adherent crusts and heal without scar." Infectious eczematoid dermatitis and dermatitis which has undergone impetiginisation should not in our opinion be called impetigo contagiosa, and no examples of these conditions were included in our series, although some of our cases of impetigo contagiosa became complicated by a spreading infection of the skin and terminated as eczematoid dermatitis. In the rest of this paper the term impetigo refers to impetigo contagiosa.

The paper records the results of an investigation of the bacteriology of 130 cases of impetigo in Service personnel (96% men and 4% women), and the treatment of the majority of them. As a rule the vesicular stage had been succeeded by the crusted before the patients presented themselves. Nevertheless it is believed that all were cases of impetigo as defined above.

Cases were classified according to their extent as mild (+), medium (++) and severe (+++). The distribution was:

Extent	*Number*	*Per cent.*
+	26	20
++	86	66
+++	18	14

BACTERIOLOGY

One culture was made before treatment, and in some cases two. Often one or more cultures were made during treatment.

When the lesion was crusted, crusts were removed mechanically and the selected site was washed with sterile saline on sterile cotton-wool. Exudate was collected on a sterile swab and was immediately cultured on a plate of blood-agar and on one of gentian violet blood-agar. This method of preparing the skin could not, however, be used when vesicles were present, owing to their fragility; and in such cases the skin was washed with acetone, dropped on it from a pipette. Vesicle fluid was aspirated into a fine capillary pipette and cultures were made as above. Plates were incubated aerobically for 24 hours at 37° C.

Cultures were made from 230 lesions on 130 patients. Every effort was made to isolate hæmolytic streptococci and even when only a single colony was found, the organism was investigated and recorded.

From the 230 lesions examined, 85 strains of hæmolytic streptococci were isolated. All but 5 of these were tested and were found to fall into the following groups:

A	69	C	3
B	0	Not A, B or C	8

Since 86% of the streptococci which were grouped belonged to group A, the assumption that the 5 which were not grouped were of group A can involve at the most a very small error, and we propose to make this assumption. Streptococci of this group may be termed *Streptococcus pyogenes*. So we arrive at the following simpler statement of our findings:

Str. pyogenes	74
Other hæmolytic streptococci	11

Staphylococci were present in cultures from 216 lesions. Of these 216 strains, 173 were found to be coagulose-positive and may therefore be termed *Staph. pyogenes*. Some of the remainder were not isolated, owing to the presence of proteus or other spreading organisms; some were accidentally discarded before being tested; and some were tested with batches of plasma which were later found to be unreliable. The last 71 strains of staphylococci which were isolated from 30 patients yielded only one coagulose-negative organism. It is not, therefore, unreasonable to assume that more than 95% of the staphylococci present were *Staph. pyogenes*.

None of the other bacteria found, which included non-hæmolytic streptococci, neisseriæ, diphtheroid bacilli, proteus and aerobic sporing bacilli, occurred more than infrequently. The presence of these, as also of hæmolytic streptococci other than *Str. pyogenes*, which were both few in number and of various groups, will be disregarded on the assumption that they were mere contaminants and played no part in causing the disease although they may have delayed its cure.

The findings in the 230 cultures from the 130 patients are summarised in table I in which only *Str. pyogenes* and staphylococci (almost all *Staph. pyogenes*) are considered.

TABLE I

INCIDENCE OF STAPHYLOCOCCI AND STREPTOCOCCUS PYOGENES

PATIENTS	*No.*	%
Staphylococci only in all cultures	79	60·7
Str. pyogenes + staphylococci in all cultures	35	26·9
Str. pyogenes + staphylococci in some but not all cultures	10	7·7
Str. pyogenes only in all cultures	4	3·1
Str. pyogenes only in some but not all cultures	1	0·8
Neither *Str. pyogenes* nor staphylococci	1	0·8
Totals	130	100·0
Staphylococci only or + *Str. pyogenes* in any culture	124	95·4
Str. pyogenes only or + staphylococci in any culture	50	38·5

CULTURES	*No.*	%
Staphylococci only	154	67·0
Str. pyogenes + staphylococci	69	30·0
Str. pyogenes only	5	2·1
Neither *Str. pyogenes* nor staphylococci	2	0·9
Totals	230	100·0
Staphylococci only or + *Str. pyogenes*	223	97·0
Str. pyogenes only or + staphylococci	74	32·2

It was possible to obtain cultures from only 10 patients in the vesicular stage of the disease. Six patients yielded 1 vesicle each, three 2 vesicles each and one 5 vesicles. The total number of vesicles cultured was 17. In every case the fluid gave a pure culture of a coagulose-positive staphylococcus (*Staph. pyogenes*).

4. Registrar-General's Decennial Supplement, 1931, Part IIa, p. 60.

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Two or more cultures were made from each of 53 patients. In the case of 42 patients, all cultures yielded the same organism or organisms. The findings in the 11 cases in which successive cultures gave different results are shown in table II.

TABLE II—CASES YIELDING DIFFERENT ORGANISMS AT SUBSEQUENT CULTURES

Culture no.	Patient no.										
	1	2	3	4	5	6	7	8	9	10	11
1	s	s		Sp. +s	s	s	neither	Sp. +s	s	s	s
2	Sp. +s	Sp. +s	Sp. +s	s	Sp. +s	Sp. +s	Sp. +s	Sp. +s	Sp. +s	s	s
3	—	—	—	—	Sp.	Sp. +s	Sp. +s	s	Sp. +s	Sp. +s	Sp. +s
4	—	—	—	—	—	—	—	—	s	Sp. +s	s
5	—	—	—	—	—	—	—	—	Sp. +s	Sp. +s	s
6 to 9	—	—	—	—	—	—	—	—	—	—	s

Sp. = *Str. pyogenes*. s = staphylococci.

We wish to emphasise particularly the following points:

1. Staphylococci (almost all *Staph. pyogenes*) were present in 223 (97·0%) of the cultures. They were isolated from some or all of the cultures made from 124 (95·4%) of the patients.

2. *Str. pyogenes* was present in 74 (32·2%) of the cultures. It was isolated from some or all of the cultures made from 50 (38·5%) of the patients.

3. Staphylococci were present without *Str. pyogenes* in 154 (67·0%) of the cultures.

4. *Str. pyogenes* was present without staphylococci in 5 (2·1%) of the cultures. Four of these cultures were the only ones made from each of 4 patients. The fifth culture was made from a patient whose lesions had been cultured twice previously. The first culture yielded staphylococci only, the second *Str. pyogenes* + staphylococci and the third *Str. pyogenes* only.

5. *Str. pyogenes* and staphylococci were both present in 69 (30·0%) of the cultures.

6. In successive cultures from the same patient, *Str. pyogenes* may either appear or disappear. It appeared more commonly than it disappeared.

7. Fluid from 17 vesicles from 10 patients yielded pure cultures of *Staph. pyogenes*.

8. No morphological differences were observed in the disease in cases the cultures from which yielded *Str. pyogenes* and in those in which they did not.

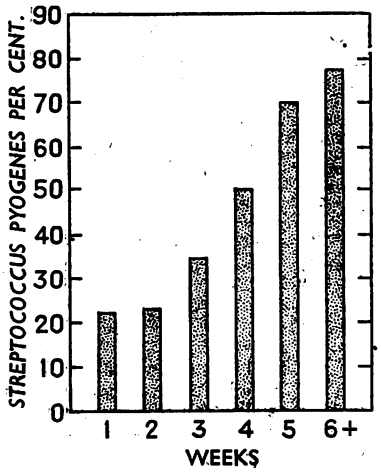
We were at first rather disappointed at the low proportion of cultures which yielded *Str. pyogenes*, although our figures are on the whole similar to those of other workers when allowance is made for the fact that the majority of these did not group the hæmolytic streptococci which they isolated. We were inclined to believe, as has been suggested by others, that the low proportion of cases yielding *Str. pyogenes* might be explained by the long period which had usually elapsed between the onset of the disease and our examination. To test this we compared the percentage of cultures positive for *Str. pyogenes* with the duration of the disease. When the first culture was made within 15 days of the onset, the percentage with *Str. pyogenes* was 21·5. When the interval between onset and examination was 16–30 days, the percentage positive was 50·0. In cases which had existed for over 30 days, 85·7% of the cultures yielded *Str. pyogenes*.

TABLE III—INCIDENCE OF STREPTOCOCCUS PYOGENES IN RELATION TO DURATION OF DISEASE

Duration of disease (days)	No. of cultures	*Str. pyogenes*	
		No. positive	% positive
1– 7	82	18	22
8–14	64	15	23
15–21	45	16	35
22–28	16	8	50
29–35	10	7	70
36 +	13	10	77

Table III shows the results with all cultures (230), including those made during treatment. The figure shows graphically how the percentage of cultures positive for *Str. pyogenes* rises week by week, just as with wounds and burns.

It was suggested that we had failed to isolate *Str. pyogenes* from early lesions because of the presence in the vesicle fluid of some substance inimical to the growth of this organism. We found that the fluid from two vesicles which, on culture, yielded a pure growth of *Staph. pyogenes* had no inhibitory effect on the growth of two strains of *Str. pyogenes* isolated from cases of impetigo.



The relation between the extent of the disease and the *Str. pyogenes* rate is shown in table IV.

The proportion of lesions in which *Str. pyogenes* was found was higher in extensive lesions than in those which were small. Since large lesions were usually older than small ones, this was what might be expected.

TABLE IV—INCIDENCE OF STREPTOCOCCUS PYOGENES IN RELATION TO SIZE OF LESIONS

Extent of disease	No. of cases	*Str. pyogenes*	
		No. positive	% positive
+	26	8	31
++	86	33	38
+++	18	9	50

TREATMENT

The investigation was originally planned to compare the effects of various methods of using sulphonamides in 100 cases. Later 30 other cases were added to the series, but as their treatment was essentially different, the results in the 100 cases will be considered first. Most of them had received some form of treatment before being seen by us.

Internal sulphonamide medication was not employed. The sulphonamides were applied locally and to facilitate their application, a Lassar's paste was used, as follows:

Pulv. zinci oxid.
Pulv. amyli āā 2 drachms
Adipis lanæ hyd.
Paraffini mollis āā 2 drachms

Six methods of treatment were tested. In all cases crusts were removed mechanically twice a day. In one group sulphapyridine was powdered on to the raw oozing surface of the lesion and was sealed in place with the paste. Another group was treated in the same way except that sulphanilamide was used instead of sulphapyridine. Three groups were treated with sulphanilamide incorporated in the paste in concentrations of 20%, 10% and 5%. Patients in the sixth group, which acted as a control, were treated with the paste alone. In all cases the paste was applied to the lesions and the unaffected skin was kept free from it. Shaving was forbidden.

Table v, which gives the results, shows that the mean duration of treatment in the 89 cases which were cured was 8·3 days. The mean duration in each group varied little from this and, owing to the small number of cases in the groups the differences are probably not statistically significant. All groups, except the 5% sulphanilamide paste, contained cases which were uncontrolled by the treatment used. The high proportion of cases in the "paste alone" group transferred to other treatments is explained by the fact that, when this treatment was not successful within ten days, an alternative was adopted. There is little doubt that, if the original treatment had

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been persevered in for a few more days, almost all would have been cured by it.

TABLE V—RESULTS OF TREATMENT IN 100 CASES

Treatment	Cases treated	% with *Str. pyogenes*	Cases cured	Duration of treatment in cured cases (days)	Cases which did not respond
Sulphapyridine powder + paste ..	11	27	10	6·7	1
Sulphanilamide powder + paste ..	14	29	13	9·1	1
20% sulphanilamide paste	18	22	17	9·8	1
10% sulphanilamide paste	22	55	19	7·3	3
5% sulphanilamide paste	16	50	16	8·8	0
Paste alone ..	19	53	14	7·6	5
	100	..	..	..	11

Of the 11 cases which failed to respond to treatment 8 (73%) yielded *Str. pyogenes* as compared with 39 per cent. positive for *Str. pyogenes* in the 89 cases which were cured by the original treatment.

One of the resistant cases (treated with sulphanilamide powder) and another (treated with 20% sulphanilamide paste) were cured with brilliant green in 7 and 16 days respectively. Four cases, originally treated with paste only, were cured in from 6 to 13 days with 10% sulphanilamide paste. One patient, treated with 10% sulphanilamide paste, was lost sight of. In four patients (one treated with sulphapyridine powder, two with 10% sulphanilamide paste and one with paste only) the disease was complicated by spreading eczematoid dermatitis. These were cured in about three weeks by bathing with 1/3000 hydrarg. perchlor. lotion and the application of calamine lotion with 2% of sulphur in the early stage and of paste in the resolving stage.

The following figures show how the extent of the disease affected the duration of treatment:

Extent	+	++	+++
Duration of treatment (days)	7·2	8·5	10·5

The relation between the time required for cure and the previous duration of the disease (treated or untreated) is as follows:

Duration of disease (days)	1–7	8–14	15–21	21–28	29 +
Mean duration of treatment (days)	9·4	8·5	7·6	8·5	7·6

The fact that the disease has existed for a long time is not a bar to its rapid successful treatment.

When it was decided to increase the scope of the investigation by the addition of a further 30 cases, every effort was made, by appealing to medical officers, to secure cases in an early stage of the disease. The limitations of hospital accommodation permitted the admission of only 14 of these cases, and those admitted were selected on a basis of short duration of the disease, presence of vesicles and accommodation available when they first attended hospital. The mean duration of the disease in these 14 cases when first seen was 6·2 days; 4 of them were seen as early as the second day of the disease; 6 of them presented vesicles. Only 3 (none of them in the vesicular stage) yielded *Str. pyogenes*. Several of the cases with vesicles had not been treated at all before admission to hospital.

The treatment adopted was suggested by the comparative success of treatment by paste alone. It consisted in mechanical removal of crusts once a day, the raw areas exposed being covered with dry sterile dressings. No local medication was employed until the areas were dry and covered by loosely adherent scabs, indicating healing, Lassar's paste was then applied for one or two days to complete the cosmetic effect. By this method all these patients were cured in from 5 to 17 days (mean 9·8 days). In confluent and progressive lesions, oozing usually continued for 4 or 5 days and but rarely for as long as 8 days.

EXPERIMENTAL

Many attempts to transmit impetigo were made. The materials which it was hoped would convey the infection were crusts, fluid from oozing lesions, fluid from unopened vesicles and suspensions of *Staph. pyogenes* isolated from cases of impetigo. The sites selected were the arms and legs of unaffected persons and the unaffected skin of the faces and necks of persons suffering from the disease.

The following experiments were performed—most of them several times.

1. Crusts were applied to the skin and kept in contact with it for three days with 'Elastoplast.'
2. Fluid from oozing lesions was allowed to dry on the skin which was left uncovered.
3. The skin was treated overnight with 10% KOH; gauze moistened with fluid from an oozing lesion was applied to the treated skin and kept in contact with it for three days with elastoplast.
4. The skin was scrubbed with gauze moistened with acetone. Vesicle fluid was then vigorously rubbed on the treated area which was either left uncovered or was covered with gauze held in place with elastoplast.
5. Similar to 4 but using a suspension of *Staph. pyogenes* in broth.

None of these methods of inoculation produced any lesions. The following materials were then inoculated by scratch, the inoculation site being either left uncovered or being covered with a sterile dressing kept in place with elastoplast:

6. Fluid from oozing lesion.
7. Vesicle fluid.
8. Suspension of *Staph. pyogenes*.

The same three materials were inoculated by scarification, the inoculation site being covered with a sterile dressing kept in place with elastoplast (9, 10, 11), and by multiple puncture, the wounds being dressed as before (12, 13, 14). Finally, the following materials were inoculated intradermally, the inoculation site being left uncovered:

15. Vesicle fluid.
16. Suspension of *Staph. pyogenes*.

Inoculation by methods 6 to 14 often gave rise only to a reaction similar to that following the same trauma inflicted with sterile instruments. In some cases, however—and invariably with methods 15 and 16—the site of inoculation showed marked local reaction with erythema followed by loss of the superficial epithelium of an area of skin extending for some distance around the wound. Oozing occurred and, in some cases, persisted for two or three days. Exceptionally, minute vesicles developed which later became pustules. In a few cases where two adjacent areas of skin were inoculated, one with vesicle fluid and the other with a suspension of *Staph. pyogenes*, the resulting lesions were indistinguishable from one another. Serial transfers from person to person were carried out in a few cases without any alteration in the type of lesion produced being observed. We were surprised at the rarity with which definitely purulent lesions resulted from inoculation with suspensions of *Staph. pyogenes* or with morbid fluid containing the same organism.

The lesions produced were of considerable interest: in some cases they presented points of resemblance to those of impetigo, but we were not satisfied that any could be called impetigo.

DISCUSSION

When we commenced this investigation we were still under the influence of various authorities who have stated that impetigo is caused by a streptococcus. Several papers in recent years have given accounts of failures to isolate streptococci from the lesions of the majority of patients suffering from impetigo and we wished to see whether we could not be more successful than the authors in isolating what we then had no doubt was the causative organism.

Our results show that we were no more successful than others in isolating streptococci from impetigo lesions. Using methods which we have convinced ourselves will reveal the presence of streptococci even when they are enormously outnumbered by other bacteria, we have not found these organisms present in the majority of our cases. The most common streptococcus found was *Str.*

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pyogenes, and we believe that the others may be disregarded. It may be contended that *Str. pyogenes* was not isolated from the majority of our cases because we examined chiefly late lesions in which the causative organism had been replaced by the commoner staphylococcus. Our reply is that we have shown an increase in the proportion of cases yielding *Str. pyogenes* as time progressed, and that the earliest lesions studied (the vesicles) yielded not a single streptococcus.

A legitimate criticism of our experimental work is that we did not inoculate cultures of *Str. pyogenes*. We did not consider it justifiable to risk the serious consequences which have so commonly followed accidental inoculation with this organism. Furthermore, even if impetigo had resulted from inoculation with *Str. pyogenes*, this would have proved only that this streptococcus may cause impetigo: it would not have proved that it is exclusively or even commonly responsible for the disease.

In view of our results, the theory that impetigo is due solely to streptococci must be abandoned. We are prepared to go further and say that streptococci are seldom, if ever, the cause of impetigo. A very much better case can be made out for *Staph. pyogenes* as the cause of the disease. It is almost always present in the lesions, failure to isolate it not being more common than failure to isolate *C. diphtheriæ* in cases of diphtheria. Most convincing of all is the finding of the organism in pure condition in 17 intact vesicles.

The postulates usually attributed to Koch require more than the demonstration of the presence of a particular organism in the lesions of a disease. To establish its ætiological rôle they require its cultivation for several generations outside the body, reproduction of the disease when it is introduced into the body of an animal (or man), and its isolation from the lesions so produced. We have demonstrated the almost constant presence of *Staph. pyogenes* in impetigo lesions and have cultivated the organism outside the body, but we have not reproduced the disease by any of the methods of inoculation of the organism which we have practised.

At first sight this failure would appear to rule out *Staph. pyogenes* as the cause of impetigo; but we have equally failed to produce impetigo by similar methods of inoculation using exudate from cases of the disease which should contain the causative organism or organisms. The explanation of our failure to reproduce the disease by inoculation may be that our inoculations were performed mainly on the arms, whereas impetigo occurs much more commonly on the face. It should be recorded, however, in this connexion that in some instances inoculation of the face of an actual case failed at a time when new lesions continued to appear elsewhere on the face of the same person. We can but express our surprise at our failure to reproduce a disease which is always held to be contagious.

It is possible that impetigo is caused by *Staph. pyogenes* introduced by some method of inoculation completely different from those we used in our attempts to produce the disease experimentally.

The hypothesis which appeals to us is that impetigo is due to the combined action of *Staph. pyogenes* and *x* where *x* is an unknown factor, animate or inanimate, physical or chemical. The nature of the disease, especially in its early stages, suggests that *x* might be a virus, and the virus theory should not be lightly abandoned; but if it were true one would expect the virus to be present in the vesicle fluid with the staphylococcus and that the inoculation of the two would produce impetigo. We prefer to suggest that *x* is inanimate and is distributed generally throughout the body, or at least the skin, of certain persons and that impetigo is produced when *Staph. pyogenes* is inoculated into the skin of a person with *x*. It would not be profitable to speculate further as to the nature of this hypothetical *x* than to suggest the possibility of it being a particular degree of susceptibility or immunity, the presence of some unusual metabolite or the absence of some essential food substance.

In such a sea of doubt and difficulty we can but restate our beliefs which we summarise in two statements:

1. Streptococci, whether hæmolytic or non-hæmolytic, are rarely, if ever, the cause of impetigo.

2. *Staph. pyogenes* is either the causative organism of all or of the majority of cases of impetigo or plays an important part in the ætiology of the disease.

The failure of sulphonamides, in the majority of our cases, to reduce materially the time required to cure the disease is an additional argument against *Str. pyogenes* being the cause of impetigo. Provided that crusts are regularly removed, extraneous infection prevented and irritating medication avoided, most cases cure themselves in 10 days or less. Since in many late cases the lesions become infected with *Str. pyogenes* we believe that one of the sulphonamides applied locally (or, if preferred, administered orally) is useful against the complications of the disease rather than against the disease itself. Our preference is for a method of treatment not described in this paper—mechanical clearing of crusts and liberal dusting of the affected parts with sulphanilamide powder, applied without a covering of paste.

SUMMARY

(1) From the lesions of 130 patients suffering from impetigo contagiosa, 230 cultures were made. Of these 97% yielded staphylococci (almost all *Staph. pyogenes*) and 32% *Str. pyogenes*. Staphylococci were present without *Str. pyogenes* in 67% of the cultures, while *Str. pyogenes* was present without staphylococci in only 2%. Cultures from 17 unopened vesicles from 10 patients yielded only *Staph. pyogenes*. The longer the disease had existed, the higher was the proportion of cases yielding *Str. pyogenes*.

(2) All attempts to produce impetigo contagiosa experimentally failed.

(3) It is believed that impetigo contagiosa is rarely, if ever, caused by streptococci of any type. Most, if not all, cases are due to *Staph. pyogenes* acting either alone or in conjunction with a hypothetical factor, the possible nature of which is discussed.

(4) The great majority of cases can be cured within 10 days by local treatment. The essentials are removal of crusts, prevention of extraneous infection and avoidance of irritating medication. Sulphonamides applied locally help to prevent or cure secondary infection.

IMPETIGO

ÆTIOLOGY AND TREATMENT

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SINCE the introduction of the sulphonamide group of drugs there have been several investigations of their value in the treatment of impetigo contagiosa, often based on the view that the ætiological agent of the disease is a hæmolytic streptococcus. A bibliography is given by Cohen (1942). The present study is an attempt to obtain some further evidence on the matter.

The patients investigated were 97 soldiers with active impetiginous lesions in an uncomplicated state. Most had had no previous treatment, though a few had had some treatment which had obviously been without effect. They were all sufficiently severe to have required admission to hospital. The cases studied were of all the usual clinical types, and included 7 cases of circinate impetigo. Lymphadenitis and paronychia were present in a few instances. The bacteriological findings on film and on culture were in the main similar to those reported by most previous investigators, and only the more salient points need be noted.

Staphylococcus aureus was always coagulase-positive; hæmolysin production was variable and soon lost on subculture; pigment production was considerable in strains isolated from circinate lesions; coagulation of litmus milk was most rapid in strains which were slow mannite-fermenters. *Staph. albus* was of various types, a few of which were coagulase-positive. *Streptococcus hæmolyticus* gave the usual cultural characters. Grouping was only carried out with two of the strains, both of which were group A. Various other organisms were found, but not sufficiently often to merit consideration here.

Table I shows that *Staph. aureus* was present in nearly every case, that streptococci were not isolated in this particular series as often as has been reported by some investigators (Cruickshank 1941) and that there was a relatively low incidence of these organisms in fluid from

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TABLE I—BACTERIOLOGY OF IMPETIGO LESIONS

Source of fluid	No. of cases	Organisms cultured		
		Staph. aureus pure	*Staph. aureus* and streps.	*Strep. hæmolyticus* pure
Blister ..	22	20	1	1
Under crusts ..	81	58	16	7

fresh blisters as compared with that in fluid from under crusts. As has been pointed out by Lewandowsky (1922) and many writers subsequently, cases with heavy streptococcal involvement usually show certain characteristics by which the bacteriological diagnosis can be made on clinical grounds with a fairly high degree of accuracy when the patient is first seen. The evidences of streptococcal infection in the present cases were as follows: an erythematous zone around the lesions; a tendency for the crusts to be very large and yellow; a white sodden appearance of the base of the lesion after the crust is picked off. This contrasts with the clean red base oozing clear serum which is usually seen in uncomplicated staphylococcal infections.

INOCULATION EXPERIMENTS

With a view to ascertaining which organism is responsible for impetigo, a series of inoculations of human skin was carried out with various organisms cultured from impetigo lesions and also with the fluid taken directly from such lesions. The subjects were all male adults. Some of the inoculations were made on a healthy man; others were made on patients with spontaneous impetigo. The site of inoculation in these latter cases was always at least 5 cm. away from any impetigo lesions, in order to avoid accidental contamination as far as possible. In some cases the patient was inoculated with organisms from his own lesions, in other cases with organisms from a different patient. In 15 of the early attempts, the inoculum was rubbed on to normal undamaged skin, but the results with all organisms were negative and these experiments need no further consideration. In all subsequent cases the skin was thoroughly scarified by cross-hatching with a needle over an area about 1 cm. diameter (this was usually sufficiently deep near one corner to produce a slight oozing of blood) and the inoculum was then rubbed very vigorously into the area for about a minute. Apart from gentle washing, no previous sterilisation of the skin surface was done. The amount of inoculum used was a very large loopful of a fresh 24-hour culture of the organisms on blood-agar (primary or first subculture) or a large loopful of fluid from a freshly opened blister or from under a crust. The sites of inoculation were skin of forehead, forearm and anterior chest wall. After inoculation, the sites were covered by a large metal cap held in position by plaster so that no extraneous infection would be liable to occur.

TABLE II—RESULTS OF INOCULATIONS OF SCARIFIED SKIN

—	Inoculum				
	Impetigo fluid	*Staph. aureus*	*Staph. albus*	*Strep. hæmolyticus*	*Staph. aureus* and *Strep. hæmolyticus*
Total inoculations	18	13	10	9	1
Lesions:					
Aborting vesicle	6	1	0	0	0
Crusting vesicle	8	4	0	0	1
Full impetigo ..	4	4	0	0	0
Other lesions ..	0	2	0	7	0
Negative ..	0	2	10	2	0

The results of the inoculations are shown in table II. The descriptions of the lesions produced require a little explanation. An "aborting vesicle" appeared in one day, was bigger the next day, and then resolved without crusting in the next two or three days. A "crusting vesicle" was like the previous one until about the third day when a crust formed which remained for another three or four days and left a small red-brown mark when it fell off. Small lesions of this sort were like miniature impetigo spots; the larger ones could be classed as almost ordinary impetigo lesions. "Full impetigo" was a larger vesicle for two days with gross honey-crust formation on the third day; the crust came off at about the eighth day leaving a red-brown mark. The lesion was clinically a typical impetigo. In the *Staph. aureus* inoculations, it was followed by one or more daughter-lesions of similar type on the surrounding skin, but, for some unknown reason, these did not develop around lesions produced by inoculation of blister fluid. The "other lesions" of the streptococcus inoculations were aborting papules which developed within a day, and then subsided in the next two days without vesiculation or scabbing. The "other lesions" of the staphylococcus inoculations were oozing areas of desquamation which became covered about the fourth day with a thin varnish-like scab which remained adherent for four or five days more. This did not resemble true impetigo.

The important points arising from this table are:—

(*a*) The difficulty of reproducing full impetigo, even with inoculations of fluid from fresh lesions. The fluids from a blister and from the raw surface under the crust are both infectious; true impetigo was produced with each of these fluids.

(*b*) The similarity between the results of inoculations with fresh fluid from impetigo lesions and of those with *Staph. aureus* cultured from impetigo lesions.

(*c*) The lack of pathogenicity of all strains of *Staph. albus*, though 3 of those used were coagulase-positive.

(*d*) The failure to produce lesions in any way suggestive of impetigo by the inoculation of *Strep. hæmolyticus* cultured from impetigo lesions. Small transient papules without crusting were the only results obtained.

(*e*) The fact that a combination of *Staph. aureus* and *Strep. hæmolyticus* produced a lesion similar to that caused by *Staph. aureus* alone. This was, however, only a single isolated experiment.

(*f*) There is no evidence in favour of the view that the organism of impetigo may have been lying dormant in the areas of skin inoculated, and that it may then have been lit up by the scarification. The negative results with *Staph. albus* are controls which militate against such an explanation, though Flehme (1920) has produced results in favour of it.

If these results were taken by themselves, they would provide presumptive evidence that *Staph. aureus* is the ætiological agent of impetigo, but their significance is definitely reduced when they are considered in relation to the previous studies on these lines. Numerous workers have attempted to produce impetigo on human skin by inoculation of fluid or crusts from the spontaneous lesions and also with staphylococci and streptococci cultured from these lesions. There is fairly general agreement that success is obtained only in about 10–25% of inoculations. Here the agreement ends. One series of workers have produced apparently satisfactory proof that impetigo can be transmitted by staphylococci but not by streptococci, and another series of equally careful workers find that it can be transmitted by streptococci but not by staphylococci. Clues to published work will be found in the papers of Müller (1927), Jessner (1934), Tachau (1938), Epstein (1940) and Hope-Simpson (1941). The present unsatisfactory state of what should theoretically be an easily solved problem is that the evidence in favour of each of the contradictory answers appears to be equally convincing. However, for the purpose of discussing the main factors in these inoculations, it will be assumed that the present results are valid.

It is difficult to accept the theory that spontaneous impetigo lesions develop only on skin which has recently been subjected to minor invisible traumata caused by some unknown hypothetical agent. Nevertheless every attempt to reproduce impetigo by inoculation of undamaged skin was unsuccessful. Success was obtained when the skin was vigorously scarified. No intradermal or subcutaneous injections were done as it did not appear that these would be in any way similar to the ordinary manner of infection, though some workers

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claim to have produced ecthyma by this method of inoculation.

From the ordinary incidence of spontaneous impetigo it would be expected that a higher incidence of successful inoculations would be obtained in children than in adults. This matter could not be tested under present conditions; nor was it practicable in this investigation to inoculate on the lower part of the face, which is the area usually involved in spontaneous impetigo. The areas of skin inoculated were forehead, thorax and forearm. The first of these sites is sometimes involved in spontaneous impetigo; the second two are only rarely affected. It might perhaps have been expected that inoculations would have been more successful on the forehead, but, in point of fact, there was no significant difference between the incidence of takes on any of the sites. Spreading impetigo was produced both on forearm and thorax, so that these are not immune areas of skin. In these experiments no relationship could be established between the results of inoculations with various organisms and the type of organism present in the spontaneous lesions; there was no clue to any variation of susceptibility to infection among different patients, apart from the actual results of the inoculations.

The ordinary lesions of impetigo develop on areas of skin which are exposed to light, soap and water, and minor traumata. As will be shown later, impetigo lesions have a tendency to heal spontaneously if covered by a metal cap. The inoculated areas were kept covered by metal caps, and the possibility arises that these caps might have interfered with the development of lesions under them. To check this point, inoculations with blister fluid were made on three areas of skin on 2 patients. One area was left undisturbed as a control, one was exposed daily to the light and rescarified each day, and one was rubbed daily with soap and water. These treatments did not cause any obvious differences in the lesions. Furthermore, full impetigo was produced in several cases where the metal shields were left undisturbed for a few days after the inoculation.

In only 2 instances were cultures taken from inoculation lesions. These were both from spreading impetigo which had been produced by inoculation of *Staph. aureus* about nine days previously. Fluid from an unruptured blister gave a pure growth of *Staph. aureus*. Fluid from beneath a crust which had become surrounded by a zone of congestion gave a mixed growth of *Staph. aureus* and *Strep. hæmolyticus*, both in large numbers. These findings are in agreement with those which have been made in spontaneous impetigo, and show that the inoculation lesions are bacteriologically, as well as clinically, similar to those of ordinary impetigo.

TREATMENT

Impetigo is a condition subject to spontaneous healing and also to spontaneous exacerbations. In order to have controls covering this matter, and also to try to avoid the general effects due to possible absorption of various agents applied locally, the lesions on each patient were divided into three or four areas and each area was given a different treatment. The treatments were assigned to the different areas on a chance system to avoid any personal element in such allocation; lesions of ears and eyebrows are known to be more difficult to cure than lesions on other parts of the face. As a further control, a few lesions were left untreated, apart from either covering with a metal cap or light dusting with starch powder. These lesions were always single ones well isolated from the main groups of lesions and, as a result, had possibly less tendency to extend; they healed however with striking rapidity. It was not found possible to extend this series to 25 as with other lines of treatment. Apart from the treatments detailed below, the only instructions given to the patients were to omit washing and shaving until they were cured. No internal administration of drugs was employed.

Compound paste.—Remove crusts daily and rub in the following paste:—

Copper sulphate ..	gr. 3	Zinc oxide	½ oz.
Zinc sulphate ..	gr. 2	Starch powder ..	½ oz.
Precipitated sulphur	gr. 5	Soft paraffin	1 oz.
Sulphathiazole	10 tablets, powdered		

Compound powder.—Do not remove crusts. Dust lesions every day thickly with the following powder:—

Sulphathiazole ..	..10 tablets, powdered
Zinc oxide	½ oz.
Starch powder	½ oz.

Sulphathiazole ointment.—Remove crusts daily and rub in sulphathiazole, 10%, in Mumford base.

Gentian-violet and zinc paste.—Do not remove crusts; paint daily over surface of lesions and surrounding skin with 2% aqueous gentian-violet solution, and when dry cover with zinc paste.

Alibour paste.—Do not remove crusts; apply the following paste daily over the lesions and surrounding skin:—

Copper sulphate ..	gr. 6	Zinc oxide	dr. 2½
Zinc sulphate ..	gr. 4	Starch powder ..	dr. 2½
Precipitated sulphur	gr. 10	Soft paraffin	dr. 2½
Spirits of camphor	min. 5		

Sulphanilamide ointment.—Remove crusts daily and rub in the following ointment:—

Sulphanilamide	30 %
Oleic acid	10 %
Lanoline	60 %

Sulphanilamide cream.—Remove crusts daily and apply the following cream:—

Sulphanilamide	30 %
Oleic acid	10 %
Cod-liver oil	60 %

Zinc paste.—Do not remove crusts; apply the following paste daily over the affected areas:—

Zinc oxide	dr. 2
Starch powder	dr. 2
Soft paraffin	dr. 4

Gentian-violet.—Do not remove crusts. Paint the affected areas daily with 2% gentian-violet in aqueous solution.

Ammoniated mercury ointment.—Remove crusts daily and rub in ung. hyd. ammon. (BP).

No treatment.—Do not remove crusts; cover with a metal cap held down by adhesive plaster, or powder daily with starch powder.

Modified paste.—Remove crusts daily and rub in a mixture of 0·5% gentian-violet in compound paste.

The results of the different lines of treatment are shown in table III. The numbers indicate the progressive total of complete cures by each day. The criterion of complete cure was that the skin over the whole area treated was soundly healed. With certain lines of treatment not involving daily removal of crusts there were sometimes old crusts remaining lightly adherent to the underlying skin surface; these were removed when apparent healing had occurred and the area was passed as satisfactory if the skin beneath every lesion was dry and sound. In all cases the healed area was watched for at least two days more to make certain that no recurrence was developing. Cases with recurrence are classed as not healed even though apparently soundly healed before the recurrence. Cases not healed in nine days are grouped together in the table. Some of these healed on the same treatment within a further two or three days; in other cases the treatment was abandoned at nine days because the lesion was obviously becoming

TABLE III—EFFECT OF VARIOUS TREATMENTS
(25 CASES OF EACH IN LONGER SERIES)

Treatment	Progressive total of cases completely healed on each day						Not healed by 9th day
	4	5	6	7	8	9	
Longer series							
Compound paste	12	16	22	23	25	—	0
Compound powder ..	7	12	20	21	24	25	0
Sulphathiazole ointment ..	4	7	14	19	21	22	3
GV and zinc paste ..	5	13	16	17	19	21	4
Alibour paste	3	8	15	18	18	22	3
Sulphanilamide ointment	2	6	10	15	17	21	4
Sulphanilamide cream ..	0	4	7	11	15	17	8
Zinc paste	5	5	9	12	14	15	10
GV	6	9	11	12	14	14	11
Ung. hyd. ammon. ..	1	3	6	10	11	12	13
Shorter series							
No treatment (9 cases) ..	5	7	7	7	8	9	0
Modified paste (7 cases) ..	4	6	6	7	—	—	0

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worse. No treatment was given up, however, before the ninth day except when the area was healed. The results varied not only between one line of treatment and another but also between one patient and another. In some patients all the lesions healed, presumably spontaneously, in three or four days irrespective of the treatment, but in other patients the lesions under the unsatisfactory treatments were stationary or became worse while other lesions under better treatments were healing rapidly. These latter patients provide the essential test.

The main conclusions from these results of treatment are as follows:—

(*a*) Sulphathiazole appears to have a definite curative effect. This is in agreement with the findings of Steigman (1942).

(*b*) Sulphanilamide when mixed with oleic acid and lanoline or cod-liver oil does not appear to be of any value as compared with non-specific treatments.

(*c*) Zinc paste has an adjuvant action (as is seen with sulphathiazole, alibour and gentian-violet) but has no direct action on impetigo.

(*d*) Ung. hyd. ammon. gives relatively poor results. In addition, it may be noted that 3 of the 25 cases treated with this ointment developed adenitis of the glands draining the area and pyrexia for a few days.

(*e*) Gentian-violet alone is also an unsatisfactory treatment despite its antiseptic effect on cocci.

The compound paste which is given first place in the table produces the most satisfactory results and could well be the yardstick for comparative studies of other treatments. Both the compound paste and the compound powder produced steady progressive healing from the first day of application; the cases taking over four days had their actual impetigo cured by about this day but were not fully epithelialised. There was never any flaring-up of lesions such as was liable to occur with all the other methods of treatment, and never the slightest recurrence. The cases treated by these two methods were of all types, many with gross confluent lesions involving the ears. The compound paste is the better for lesions near the angles of the mouth, where fissuring is liable to occur when only the powder is used; and it is quite as good as (or better than) the powder in other sites. The relative importance of the various ingredients in the compound paste has not yet been investigated. The paste is certainly better than sulphathiazole ointment, alibour or zinc paste separately, but it would be of interest to omit each ingredient in turn to find which are significant. As far as was seen in the short additional series, the modified paste made by incorporating gentian-violet does not present any particular advantages.

Two further points may be mentioned. First, the response to the various treatments did not appear to depend in any way on the bacteriological findings or the clinical types. Circinate impetigo healed as well as ordinary impetigo with each treatment. Cases with hæmolytic streptococcal infection healed in the same average time as cases with pure staphylococcal infection, the time varying only with the type of treatment. Secondly, nothing dogmatic can be said on the question of whether to remove crusts (so as to allow antiseptics to act on the underlying lesions) or to leave the crusts as a natural protective dressing. With the introduction of a specific antiseptic such as sulphathiazole there is probably something to be said for removing the crusts, at any rate at the beginning of treatment; but the matter has not been studied with adequate controls in the present investigation. The partial control of compound paste versus compound powder does not however suggest that the matter is of great importance.

SUMMARY

Staph. aureus is present in nearly all impetigo lesions from the earliest stages, whereas *Strep. hæmolyticus* is common only after the initial blister has become crusted.

Inoculations of human skin with *Staph. aureus* reproduced impetigo with about the same frequency as inoculations with fluid from spontaneous impetigo lesions. Inoculations with *Strep. hæmolyticus* and with *Staph. albus* did not produce any lesions of this type.

The spontaneous lesions on each patient were divided into three or four areas, each of which was treated by a different method. These comparisons indicate that sulphathiazole is of definite value in the treatment of impetigo. A compound paste is described which, in a series of 25 cases, cured most within five days and all within eight days.

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SURVIVAL OF NORMAL ERYTHROCYTES AFTER TRANSFUSION TO PATIENTS WITH FAMILIAL HÆMOLYTIC ANÆMIA

(ACHOLURIC JAUNDICE)

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A STUDY of the survival time of normal blood in the circulation of recipients affected with familial hæmolytic anæmia should provide important evidence as to the mechanism of the hæmolytic process in this disease. Nevertheless, very few attempts have been made to estimate the survival time of transfused blood in such cases. This is undoubtedly due to the fact that the differential agglutination technique for estimating survival has only lately started to commend itself to workers as a valuable and reliable method of investigation.

A method of estimating the survival of transfused erythrocytes by means of differential agglutination was first applied to man by Ashby (1919). She showed that after transfusing blood of group O to a recipient of another group, say A, the recipient's cells could be agglutinated with anti-A sera and the unagglutinated group O cells (of the donor) could then be counted. Wiener (1934), who used differences in MN type between donor and recipient as a basis for differential agglutination, claimed that consistent results could be obtained with the method and stated that after transfusion (presumably to "normal" recipients) the donor erythrocytes are steadily eliminated from the recipient's circulation over a period of 80–120 days. Mollison and Young (1942) in agreement with Wiener also found that the donor erythrocytes were eliminated from the recipient's circulation at an approximately constant rate after transfusion and observed that in a group of 15 cases elimination was not complete before the end of 109 days (on the average).

The survival of transfused blood has been estimated in isolated cases of hæmolytic anæmia by Ashby (1921), Placeo (1928) and Dekkers (1939). Insufficient data are published, however, to establish beyond doubt the diagnosis in these cases. Dedichen (1932), on the contrary, studied 2 patients in whom the diagnosis of familial hæmolytic anæmia appeared to have been fully established. In both cases rapid disappearance of transfused blood was observed, within approximately 4 and 7 days of transfusion. Unfortunately these observations are marred by his admission of technical difficulties.

Lloyd (1941) endeavoured to estimate the survival of transfused blood in 2 patients affected with familial hæmolytic anæmia by studying the cell-diameter distribution curves after transfusion. In one case the transfused cells seemed to have disappeared by the fourth week and in the second case it was concluded that they survived for at least 17 days after transfusion. Using the same method of estimating survival, Lloyd found that most of the cells transfused from a splenectomised patient with familial hæmolytic anæmia into a hydrocephalic infant had disappeared by the tenth day, and in a second experiment blood from an active case disappeared rather more rapidly. This last experiment was repeated by Lloyd using a healthy adult as recipient with similar results. In cases in which the donor cells are of normal diameter and those of the recipient exhibit a wide variation in diameter, as in familial hæmolytic anæmia,

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it seems difficult to study by this method the survival of the normal cells with any accuracy after a substantial proportion of them has disappeared. Ashby's technique being independent of morphological differences does not suffer from this disadvantage.

In the present paper are recorded the results of estimating survival by the Ashby method in 6 cases of familial hæmolytic anæmia. In 5 patients a family history of the disease was obtained and hæmatological investigation confirmed that at least one relative was also affected. The sixth patient (case 1) was an infant; there was no obvious familial history but examination of the mother's blood revealed a definite if slight increase in fragility. In all 6 cases the classical features of splenomegaly, anæmia, spherocytosis, increased fragility, reticulocytosis and hyperbilirubinæmia were present. In 5 of the patients (cases 2, 3, 4, 5 and 6, aged 72, 45, 43, 41 and 9 years) there was a history of anæmia and jaundice extending over many years. In case 1 (the infant, aged 1 year) the disease had been manifest since the age of 2 months.

As a subsidiary experiment, blood was taken from one of the patients, both before and after splenectomy, and transfused to patients affected with mild secondary anæmias.

METHODS

In all 6 cases group O blood was used for transfusion; in 5 cases the recipient belonged to group A; in case 3 the recipient belonged to group O and differential agglutination was carried out by means of an anti-M test serum kindly supplied by Dr. G. L. Taylor.

In cases 2–6, a concentrated cell suspension was used for transfusion. This was prepared from two or more bottles of blood stored in citrate-glucose for a few days, whose survival in healthy subjects should therefore be normal (Mollison and Young 1942). In case 1 defibrinated blood, previously stored for 24 hours, was used.

Blood samples were withdrawn from the recipient before the transfusion, immediately after the transfusion, on the following day, and then at intervals (usually every 14 days) until the experiments were terminated.

The use of large amounts of blood for transfusion greatly increases the accuracy of the Ashby method. In the present experiments, an initial concentration of between 800,000 and 2,200,000 donor cells per c.mm. was produced in the recipient's circulation. In all the cases the blood was taken from donors who appeared to be in good health.

In the subsidiary experiments, blood was first obtained from case 4 (group A, type N) and transfused within 2 hours of taking to a second patient (group A, type M) suspected of suffering from a carcinoma of the rectum. Immediately after this transfusion a second transfusion of blood (group O; type MN) from a normal donor was given to the recipient so that its survival could be estimated as a control. The survival of both bloods in the recipient's circulation was followed by the method suggested by Mollison and Young (1940), which makes use of anti-A (or -B) sera, as well as anti-M (or -N) sera. Blood was obtained from case 4 a year after splenectomy and the above experiment repeated. In this case, however, no control transfusion was given simultaneously since the recipient was only affected with a mild post-hæmorrhagic anæmia.

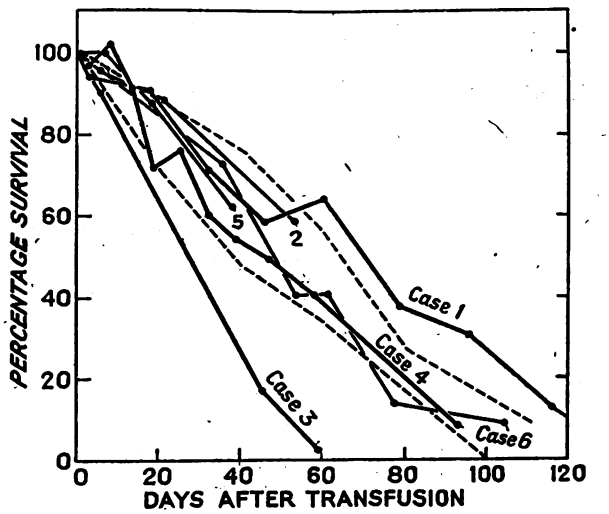
TECHNIQUE

Accurate results with the Ashby technique can only be obtained when agglutination of the recipient's erythrocytes is virtually complete. This necessitates the use of very potent agglutinating sera with titre approximately 1000 or more as estimated by a technique in which the end-point is read microscopically, and clumps of 3–5 cells are taken as the least evidence of agglutination (Taylor and Ikin 1939). It may be necessary to test a very large panel of donors before suitable sera are obtained. Even with high titre sera, Ashby's original technique has not been found to be satisfactory and various modifications can be employed with advantage (Mollison and Young 1940).

It has since been found that the time necessary for full agglutination can be considerably shortened and agglutination often improved, without impairing the accuracy of the method, by centrifuging the mixture of cells and serum. The technique used is therefore described in detail.

A 1 in 51 suspension of the recipient's blood is prepared by taking 20 c.mm. into 1 c.cm. of saline in a small test-tube. Preferably, venous samples of blood are used, and in that case the dilution error may be reduced by using a large volume of blood (say 0·1 c.cm. in 5 c.cm. saline). If necessary, however, the 20 c.mm. or 0·1 c.cm. of blood may be taken directly from an ear puncture.

One volume of this suspension is added to an equal volume of serum in a small test-tube (5 cm. × 1 cm.). In order to obtain efficient mixing, it is desirable to work with as large volumes as possible, but supplies of serum usually limit the amount to 1 c.cm. The mixture of cell suspension and serum is corked, mixed and left to stand at room temperature for not less than 60 min. At the end of that time the suspensions



Survival of blood from normal donors after transfusion to 6 patients with familial hæmolytic anæmia. Although not shown in the figure, survival in cases 2 and 5 was followed to completion and found to exceed 100 days in each case. The dotted lines indicate the limits of survival in a group of normal recipients (Mollison; unpublished data).

are centrifuged at approximately 1500 revolutions per minute for one minute and the tubes are then agitated to break up the sediment and free the unagglutinated cells. The tubes are then centrifuged again, and again shaken. A certain amount of practice is necessary to learn the amount of shaking required, but providing moderation is used, shaking will not increase the amount of free cells above a certain constant figure. In every case, the tests must be initially controlled by agglutinating a sample taken from the patient before transfusion. With this technique there will often be less than 10,000 unagglutinated cells per c.mm. in the pretransfusion sample and the number of free cells rarely exceeds 50,000 per c.mm. A further control is provided by demonstrating at the termination of the experiment that the number of free cells has returned to the pretransfusion figure.

With anti-M and anti-N sera, centrifugation cannot be employed because it usually causes some non-specific agglutination unless the sera have been more fully absorbed than usual. In such cases the mixtures of cells and serum are allowed to stand for 2 hours in small flat-bottomed bottles of such a size that the mixtures are spread out in a thin layer.

When counting the number of free cells the sample should be taken from the upper layers of the mixture of free and agglutinated cells so as to minimise the number of agglutinates withdrawn.

RESULTS

(1) *Survival of normal erythrocytes in patients with familial hæmolytic anæmia.*—In 5 out of the 6 patients, the rate of disappearance of the donor cells was normal and the total survival time was between 100 and 130 days. In case 3 destruction was more rapid and was complete in about 60 days.

(2) *Survival of erythrocytes from a patient with familial hæmolytic anæmia in a normal recipient.*—Blood taken from case 4 before splenectomy was completely eliminated within 14 days of transfusion. The survival time may have been less than 14 days but no intermediate

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observations were made. Normal blood given to the same recipient at the same time survived normally.

Blood taken from case 4 a year after splenectomy again rapidly disappeared from the circulation of a normal recipient after transfusion. Only 32% of the donor cells were present at the end of 8 days and destruction was complete within 19 days.

DISCUSSION

In these experiments it was found that the rate of disappearance of normal cells after transfusion into 5 out of 6 patients affected with active typical familial hæmolytic anæmia was no greater than in the normal subject, whereas the cells of one of these patients taken both before and after splenectomy were eliminated from the circulation of a normal recipient at a rapid rate. These observations support the hypothesis that the basic abnormality in familial hæmolytic anæmia is the formation of erythrocytes with an increased tendency to hæmolysis and cannot be reconciled with any theory which assigns a major rôle to abnormal destructive mechanisms. All authors who have studied the histopathology of the spleen (Turnbull 1936, Klemperer 1938, and others) agree that congestion with blood is the most striking, if not the only, abnormality and it has been assumed that the circulation through the spleen is abnormally slow (Gripwell 1938, Fahraeus 1939). The normal survival of healthy cells may indicate (*a*) that the blood in the spleen is not unduly stagnant despite congestion, or (*b*) that stagnation is not a factor in cell destruction, despite the views advanced by Ham and Castle (1940) in a preliminary communication. In fairness to Ham and Castle it must be pointed out that they consider that intravascular stasis of a "normal degree" acting upon abnormal cells is sufficient to account for the increased blood destruction in familial hæmolytic anæmia. Nevertheless, their thesis is that intravascular stasis is an important factor initiating cell destruction in both the normal and abnormal spleen; and since, as mentioned above, histological studies suggest that stagnation does occur to an abnormal extent in familial hæmolytic anæmia, it is at first sight difficult to see how our findings can be reconciled with Ham and Castle's views. A possible solution of the difficulty is given by the hypothesis that stagnation is selective; while normal discoidal cells have no difficulty in traversing the spleen, spherocytes, possibly because of their spheroidal shape (Whipple 1941) are trapped within the splenic pulp.

The possibility that the spherocytes in familial hæmolytic anæmia are produced in some way by the action of a hæmolysin or abnormal metabolite upon normal cells (Dameshek 1942) appears unlikely in view of the results of our experiments, unless it is considered that the hypothetical hæmolytic agent is strictly specific for the patient's own cells.

In view of the results in 5 patients in whom a normal survival time of normal blood was found, the impaired survival found in case 3 was unexpected, especially as this patient was the daughter of case 2. Further study, however, revealed that this patient was Rh-negative (whereas the other five patients were Rh-positive); moreover the donor blood was Rh-positive and following its disappearance from this patient's circulation, anti-Rh agglutinins appeared in the serum. Since the publication of the work of Wiener and Peters (1940) it has been recognised that Rh-negative persons are liable to produce antibodies against Rh-positive blood and thus to eliminate it abnormally rapidly.

The normal survival time found in 5 cases of familial hæmolytic anæmia is in strong contrast to that observed in a control series of cases of hæmolytic anæmia of varied types in which cell destruction was always rapid and usually complete within 20 days of transfusion.†

An interesting parallel to the finding of a normal survival of transfused blood in patients with familial hæmolytic anæmia is provided by some recent observations made on a patient with chronic hæmolytic anæmia with nocturnal hæmoglobinuria (Marchiafava-Micheli's disease). In this patient a strictly normal survival of transfused erythrocytes was also observed, despite the continuously increased rate of destruction of the patient's own cells. The finding of a normal survival time of normal blood in this disorder supports the generally accepted view that the increased rate of cell destruction, which is characteristic of the disease, is due to an abnormality of the patient's own erythrocytes.

† This small series includes 5 cases of hæmolytic anæmia of unknown origin and single cases associated with pregnancy, pulmonary tuberculosis and sulphonamide intoxication (Mollison, unpublished observations).

SUMMARY

The survival of normal blood transfused into 6 patients with familial hæmolytic anæmia has been studied by a modification of Ashby's technique. In 5 patients survival was normal; in one (case 3), who was Rh-negative, somewhat diminished.

Blood taken from a patient with familial hæmolytic anæmia, both before and after splenectomy, disappeared rapidly when transfused into a normal recipient.

The patients were investigated through the courtesy of Dr. Terence East, Dr. Douglas Firth, Dr. Maurice Pappworth, Dr. Robert Schneider and Dr. Mary J. Wilmers.

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MESENTERIC VENOUS THROMBOSIS

TREATMENT WITH HEPARIN

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MESENTERIC thrombosis is undoubtedly the most lethal of the causes of bowel obstruction, so that any new plan which holds out a promise of reducing its death-rate seems worthy of consideration. The reported series show that the chance of survival is almost nil without operation. Cokkinis [1] records 40 cases where surgery was not carried out, with 39 deaths. He believes that resection is possible in 80% of cases operated on within 12 hours, but in only 15% operated on later. For resection the operative mortality averages about 50%. This high rate depends on many factors, which include the original causes behind the disease, such as cirrhosis of the liver and portal obstruction of any type, portal sepsis, blood diseases and splenectomy. However, the main factor is a continuation of the thrombotic process beyond the limits of the resected bowel. It is here that the experience with heparin is encouraging. Murray [2] describes 6 cases of mesenteric vascular occlusion requiring resection of from 45 to 210 cm. of bowel, with recovery in 4 cases; 2 died of late complications, autopsy revealing no extension of thrombosis in the mesenteric vessels. A similar case I operated on previously, where 4 ft. 2 in. (127 cm.) of bowel was resected, was given heparin postoperatively. The patient died 48 hours after operation, probably from the associated severe liver cirrhosis, and autopsy revealed a healthy anastomosis with no evidence of extension of the thrombosis.

It occurred to me that in the early cases of mesenteric venous thrombosis, where it could be shown that the involved bowel was still viable, heparin alone would be a logical method of treatment, and this plan was adopted in the case reported here.

Laufman [3] has produced mesenteric venous thrombosis in dogs by injecting 0·5 c.cm. of a 2% solution of sodium ricinoleate into the superior mesenteric vein proximal to its junction with the splenic vein and distal to a rubber-guarded clamp. Thrombosis occurred which extended and caused death in 24–48 hours. Autopsy showed

1. Cokkinis, A. J. Post-Graduate Surgery, London, 1936. Vol. I, p. 1030.
2. Murray, D. W. G. *Surg. Gynec. Obstet.* 1941, 72, 340.
3. Laufman, H. *Ibid*, 1942, 74, 479.

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massive hæmorrhagic infarction of the small bowel due to thrombosis of the superior mesenteric and portal veins. In 3 of 5 such animals where heparinisation was maintained for 5–7 days thrombosis was circumvented, and they lived; 2 others died of hæmorrhagic infarction, and another 2, in which heparin was stopped after 24 hours, died shortly afterwards from infarction. Laufman also showed that postoperative treatment with heparin resulted in the survival of dogs where the extramural blood-supply to 10–12 cm. of intestine had been cut off. The control animals not treated with heparin all died. In strangulation obstruction, on the other hand, heparin appears to hasten death, because of the tendency to continued bleeding in a bowel which shows petechial hæmorrhages, and because of the loss of blood and blood elements into the bowel lumen and peritoneal cavity. He therefore concludes that "it is unsafe to administer heparin after operation in cases of impaired circulation of the intestine where resection is not performed. Although it appears that heparin enhances the chance of recovery of short devascularized segments, in cases of mesenteric vascular occlusion or strangulation it should be reserved only for those cases in which resection is performed."

Many patients with mesenteric venous thrombosis are seen at an earlier stage than that produced in these experiments. In these cases the bowel is definitely still viable and shows only the earliest stage of infarction, with no petechiæ and no bloody extravasation into the bowel lumen or peritoneal cavity. It is in this type of case that the mortality seems most likely to be lowered by heparinisation without resection, but this view is based on only one proven case. Further trials in a group of cases at a similar early stage must be carried out before a definite decision can be reached.

CASE-REPORT

A Jewish private in the Canadian Army, aged 42, began to have mild crampy epigastric distress about 2 PM on Nov. 20, 1942, but it was not until 7 PM, while in a cinema, that he was seized with generalised abdominal pain which rapidly became severe. He had to leave the theatre, and vomited copiously shortly afterwards. Another spasm of severe vomiting took place before admission to hospital at 8.45 PM. The bowels had moved normally in the morning, but not since. No flatus had been passed since the onset of the acute stage. There were no urinary symptoms.

There was no history of previous indigestion or attacks of abdominal pain. He had never been in hospital before, and this was the first time he had reported sick in the 2½ years since he joined the army.

The patient was writhing about in bed holding his abdomen and groaning, and it was difficult to get him to lie still for proper examination. He did not appear shocked. Temp. 97·4° F.; pulse-rate 84, respirations 26 per min.; BP 124/94 mm. Hg. The abdomen showed free respiratory excursion without aggravating his pain and no definite rigidity but definite voluntary guarding. Tenderness was generalised, but maximum at the level of the umbilicus on both sides. There was no rebound pain and auscultation revealed a quiet abdomen. Percussion note was dull, and no enlarged organs or masses were palpable; no herniæ. Rectal examination negative. Positive physical findings included a right septal deviation and a somewhat reddened throat with enlarged tonsils. There was no lead line, and the reflexes were normal. White cells 5800 per c.mm. Urine normal. The history and physical findings suggested an early small-bowel obstruction, and this was confirmed by X rays, which showed a distended small-bowel loop on the film taken lying down and several well-marked fluid levels in the upright one.

Operation.—At 10.30 PM on Nov. 20. 'Pontocaine' spinal anæsthetic. Right paramedian incision. On opening the peritoneum an abnormal amount of straw-coloured peritoneal fluid was found. Purplish distended coils of small bowel presented. Collapsed normal ileum was found at the ileocæcal junction and traced proximally. About 6 ft. from the duodeno-jejunal junction a transition from normal to distended bowel gradually took place. The involved segment was about 4½ ft. long and faded again to normal jejunum which then extended for 18 in. to the terminal duodenum. No internal hernia was present. The affected intestine was purple and distended to a diameter of 2–3 in., its peritoneal sheen was intact, and no petechiæ were present. The bowel wall was œdematous, the lacteals well marked and the mesentery thickened. No peristalsis was seen. Arterial pulsation was present, but the veins in the edge of the mesentery were dark purple and felt firm, indicating a definite thrombosis. The superior mesenteric vein was not palpable. Inspection and palpation of the liver revealed no abnormality, the spleen was not enlarged, and the appendix, though fibrotic, was not grossly diseased. Early mesenteric venous thrombosis was diagnosed, and the abdomen was closed with the plan of treating this case by heparin alone.

Postoperative course.—The pulse-rate was taken hourly for the first 4 days, being 80 immediately after operation and not rising above 88 at any time during treatment. This was thought the best guide to any extension of the thrombosis. Intravenous heparin was started at 3.30 AM on Nov. 21, 10 c.cm. (10,000 units) of the Toronto (Connaught Laboratories) product in 1000 c.cm. of normal saline being given by the drip method. The drip was inadvertently allowed to run too quickly, and when the blood-coagulation time was first estimated at 8 AM, it was found to be at the alarming figure of 87 min. Blood had soaked into the wound dressing, and it was evident that a wound hæmatoma had collected, but there was no other evidence of internal or external bleeding. Thereafter a drip of 25–30 drops per min. was found to give the best figures, although it was almost impossible to keep the coagulation-time at the optimum 15 min. Determinations were made by the capillary-tube method every 6 hours for the next 10½ days, and these varied between 8 and 34 min., the majority being between 15 and 20 min. Total heparin given during this period was 210 c.cm. (210,000 units) in 21,000 c.cm. of saline. The temperature at no time rose above 100° F., but reached 99° F. on numerous occasions up to the 15th postoperative day. The second stool passed after operation was strongly positive for blood; the subsequent three stools showed a decreasing amount. The blood Wassermann reaction was negative. The patient was out of bed on the 14th day, and was discharged on the 17th.

SUMMARY

A case of mesenteric venous thrombosis proved by laparotomy was treated with intravenous heparin without resection. It is suggested that early cases of this condition seen before serious intestinal infarction has taken place and where the bowel is definitely viable should be treated by heparin alone. It is believed that such a plan would reduce the present high mortality.

PFEIFFER'S BACILLUS MENINGITIS

RESPONSE TO CHEMOTHERAPY

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Mutch (1941) has reviewed the general features of Pfeiffer's bacillus meningitis as seen in Great Britain, and has emphasised its maximum incidence in children under 2 years, its extremely high mortality, and the tendency for localised collections of pus to accumulate in the subarachnoid space. The fatality under the age of 2 years is almost 100%; over this age it varies in different reports from 92 to 97%. Thus Neal, Jackson and Appelbaum (1934) reported 4 recoveries in 111 cases, but only one was a child—aged 2½ years. The advent of the sulphonamides was followed by several isolated case-reports of recovery after the administration of one or other of these drugs (Roche and Caughey 1939, Sakula 1940). In spite of an adverse report by Mackenzie and his colleagues (1940) high hopes were roused; but they have not been fulfilled, for Aleman (1940) reviewed 90 cases, mostly taken from published reports, treated with sulphonamides, and concluded that these drugs had little if any favourable effect. The present series of 24 cases confirms her view.

The series includes all proved cases of influenzal meningitis admitted to Bristol hospitals since 1936; thus it covers the period during which the sulphonamides came into common use. Results of any method of treatment are best evaluated by assessing the reduction in mortality under the age of 2 years because of the increasing tendency to recovery above this age. Only one adult was affected, a man of 54, who made a complete recovery after repeated spinal drainage and intravenous injections of colloidal silver (Watson-Williams 1937); his case is not further considered. All the rest were children,

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13 males and 11 females; 17 under the age of 2 years died, some with and some without chemotherapy; of 7 over that age, 4 recovered, one without chemotherapy.

CLINICAL FINDINGS

There was a regular incidence throughout the year with a slight winter peak in January and February. Pfeiffer's bacillus meningitis was the commonest type of primary purulent meningitis among children in the years when there was no epidemic meningococcal meningitis. The onset was usually insidious, a few cases starting with slight drowsiness and few signs of any intracranial infection, so that the disease was not suspected till late. The common mode of onset was with drowsiness and vomiting, to which irritability, screaming attacks and meningism were added in a few hours. Meningism as the presenting symptom was only seen in 6 patients, early meningeal symptoms were definite in 18, but were absent or very slight in 6, even just before death. The presenting symptoms were: vomiting 15 cases; drowsiness 10; convulsions 7; screaming attacks 6; meningism 6; irritability 3. Convulsive attacks were a common early feature and it was these attacks, when associated with neck-rigidity and slight head-retraction, that led to the diagnosis of intracranial infection. Kernig's sign and the signs of Brudzinski were absent or indefinite in so many cases that they were of little help in diagnosis. The meningitis appeared to be primary in 19 cases but in the remaining 5 it may have been secondary: to a lung infection in 2; to otitis media in 2; and in 1 to suppurative mastoiditis.

Complications and sequelæ were: lung infection 7 cases; stomatitis (oral thrush in 1 case) 3; *Bacterium paratyphosum B* infection 1; severe rickets 3; blood-stained nasal discharge 2; herpes labialis, scabies, conjunctivitis, whooping cough, epicranial abscess and suppurative arthritis, 1 case each. The epicranial abscess was due to Pfeiffer's bacillus but arose during treatment, thus differing from those reported by Dowds (1940) which preceded the meningitis. The purulent infection developed in the elbow-joint of a convalescent child who had been treated by chemotherapy, and the pus was sterile on culture. Death in all the fatal cases except one was due to the meningitis; the exception was case 17, a baby who, while under treatment in hospital for Pfeiffer's bacillus meningitis, contracted paratyphoid fever and died from it after making a clinical and pathological recovery from the meningitis.

FINDINGS IN THE CEREBROSPINAL FLUID

The CSF showed the changes to be expected in a purulent meningitis. Thus the fluid in the acute stages was turbid, often opalescent, milky white with none of the greenish-yellow tint seen in meningococcal or pneumococcal meningitis; twice this milkiness enabled a tentative diagnosis of Pfeiffer's bacillus meningitis to be made at once. Protein and globulin were raised, glucose figures were very low and the chlorides were much decreased. Mutch (1941) stated that, though American workers reported large numbers of organisms in the CSF, in England they tended to be scanty. Findings in this series support the Americans, for in most cases the fluid withdrawn swarmed with organisms and diagnosis was possible from a gram-stained smear of the deposit, as Fothergill (1937) suggested. In almost every case the organisms grew well on culture on the appropriate media, even when sulphonamides had previously been administered in large doses. This is in striking contrast to the behaviour of meningococci, and in itself suggests a less effective action on the bacilli. They exhibited that pleomorphism which is so characteristic of Pfeiffer's bacilli, and long filamentous forms were commonly reported, especially in the later stages of the disease. A change from the cocco-bacillary to the filamentous form has been remarked on before (Lindsay et al. 1940), and the presence of such filamentous forms does not justify a diagnosis of atypical Pfeiffer's bacillus infection. No special cultural tests or typing were carried out in this series. Although lumbar puncture was repeated in nearly all cases, examinations of the CSF were repeated in only a few cases. In these it was noted that if the disease remitted the initial high polymorphonuclear response fell and the number of mononuclear cells rose steadily; but if the disease marched steadily to an unfavourable conclusion the initial high polynucleosis was maintained or increased. The possible prognostic significance of this was not realised and the cases are so few that little positive importance can be attached to this change. No blood-cultures were performed and blood-counts showed no changes of note.

TREATMENT

Chemotherapy was not used in 4 cases; 2 (cases 21 and 22) died on the third day of disease, shortly after admission to hospital; 1 (case 23) died on the eighteenth day of disease; and 1 (case 24) recovered after a stormy illness. He was treated by repeated spinal drainage and the injection of a Pfeiffer's bacillus vaccine.

The remaining 20 patients were treated by chemotherapy, either with a single drug or a combination. Sulphapyridine was given alone to 10 cases, combined with sulphanilamide to 2 others, and with sulphathiazole to 2 more. Sulphanilamide or one of its derivatives was used alone for 6 patients.[1] All cases had the usual adjuvant treatment, almost all had repeated spinal drainage and 2 received intravenous serum, one meningococcal and one streptococcal.

The assessment of response to chemotherapy is notoriously difficult because of the number of variable factors; the table shows the details of treatment in each case. It was noted that the cases that recovered and those which showed the most clinical improvement were those who received high dosages very early in the illness. This suggests that the only hope of successful sulphonamide medication depends on very high dosage given early, preferably on the first day. "Adequate chemotherapy" is difficult to assess, but the dosage capable of causing some response in meningococcal meningitis may be used as a rough yardstick. Viewed in this way all

RESULTS OF SULPHONAMIDE TREATMENT IN 20 CASES OF PFEIFFER'S BACILLUS MENINGITIS

Case	Age (months) and sex	Drug	Death (day of illness)	Drugs given (days)	Initial dose (g.)	Total dose (g.)	Remarks
1	14 M *	SN	19	6, 15–19	0·25	2·5	Dose inadequate
2	9 M *	PS	6	3–5	0·5	2·5	Ac. hydroceph.
3	36 F	SN	7	3–6	3	16·5	..
4	28 M *	SN	15	4–8, 11–14	1·5	4·5	..
5	35 F	PR SN	..	3–6 3–6, 12–25	0·25 6	Large	Improved, relapsed
6	4 M *	SN SP	31	15–25 9–14, 25–30	1·5 2	16·5 18·5	Loculation + +
7	15 M	SN SP	36	12–15 2–9	0·75 2	3 14	..
8	6 M *	SP ST	20	8–15 16–19	1·5 1·5	12 6	..
9	19 M *	SP	2	2	4	4	..
10	5 F *	SP	4	2, 3	1·5	3	..
11	20 F	SP	15	2–14	0·75	16·5	..
12	2 F	SP	23	7–12	1·25	24	..
13	11 F	SP	14	2–14	3	25·5	..
14	15 M *	SP	33	8–32	3	45·75	Improved, relapsed
15	7 M	SP	29	3–11, 15–19	3	34	..
16	18 M *	SP	6	3–6	1·75	15·5	..
17	14 F	SP ST	30	6–14, 20–22 23–29	3 4·5	36 31·5	Recovery; d. parabyph.
18	35 F	SP	..	1–8	7·5	23·75	Dramatic recovery
19	24 M	SP	..	1–10	3	22·5	Recovery
20	54 M	SN	..	10–21	3	36	Recovery

* Autopsy done. PR, prontosil rubrum; SN, sulphanilamide; SP, sulphapyridine; ST, sulphathiazole; PS, proseptasine.

1. 'Proseptasine' (M & B), 'Sulphonamide P' (Richter), 'Prontosil Album' and 'Prontosil Rubrum' (Bayer) were the drugs used.

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might have been expected to respond in some measure except for case 1, in which the drug was used so timidly that it could not be expected to be effective.

Of the 19 cases in which chemotherapy might have been expected to show some results, 4 (cases 17–20) showed some response, one of them (case 18), aged 35 months, responding to treatment just like a meningococcal meningitis with a rapid defervescence, dramatic subsidence of symptoms and speedy convalescence. Case 17, aged 14 months, responded slowly to sulphathiazole after sulphapyridine had been ineffective, the CSF becoming sterile; unfortunately this child died of paratyphoid. Cases 19 and 20 recovered but in neither could recovery be attributed decisively to chemotherapy, since its administration was not directly followed by clinical improvement. Thus case 19, aged 2 years, had 22 g. of sulphapyridine by the eleventh day of disease; it was then discontinued because of lack of improvement and he did not improve until the 37th day. Case 20, aged 4½ years, who had meningitis with mastoiditis, was given 36 g. of sulphanilamide between the 10th and 21st days of disease (mastoidectomy on the 10th day); but again no clinical improvement or defervescence was observed till the 32nd day. Thus in only one patient (case 18) could it be claimed that chemotherapy was really effective, with the patient responding in the dramatic way seen in meningococcal or streptococcal meningitis. Such response has been observed by Jacoby (1941) in a child only a year old, but this girl was aged almost 3 years. Repeated spinal drainage was not carried out in these 4 patients, and with the exception of case 18 there seemed to be little difference in the clinical course between those who received sulphonamides and case 24 which recovered without any.

Of the remaining 15 patients (cases 2–16) who died in spite of adequate dosage of sulphonamides, sulphapyridine alone was given to 8 (cases 9–16), sulphapyridine combined with sulphanilamide to 2 (cases 6 and 7) and sulphapyridine with sulphathiazole to 1 (case 8). All these were under the age of 2 years. The remaining 4 (cases 2–5) received sulphanilamide alone, and except for case 2 were over the age of 2 years; of these, case 5 showed slight clinical improvement but relapsed in spite of intensive and sustained dosage and was taken home moribund by her parents. The other 3 showed no response. Cases 6 and 7, who received sulphapyridine and sulphanilamide, had a slight fall in temperature after sulphapyridine but since they showed no clinical improvement sulphanilamide was substituted and proved ineffective. One baby (case 8) did not respond to sulphapyridine and its substitution by sulphathiazole effected no improvement.

Of the 8 patients who received sulphapyridine alone, 2 (cases 9 and 10) died within 36 hours of admission to hospital (3rd day of disease), showing no response; 5 more (cases 11, 12, 13, 15 and 16) died without response to longer treatment; and the last (case 14) showed a slight initial response, partial defervescence with slight clinical improvement, but deteriorated again and died despite intensive treatment. Thus the effects were disappointingly slight and not comparable to those seen in other forms of purulent meningitis.

AUTOPSY FINDINGS

Mutch (1941) pointed out that meningeal loculation of pus was a common finding in meningeal infection with Pfeiffer's bacillus, and that when this happened it was impossible to relieve the high intracranial pressure by lumbar or cisternal puncture. Loculation was a striking feature in the cases treated by Fothergill and Ward (1932) who used a trephine to try to drain the meninges. The sulphonamides are notoriously ineffective in the presence of abscess formation, and so was the specific antiserum used by Fothergill and Ward; loculation might explain the failure of chemotherapy in their cases. Neal and her colleagues (1934) however deny that extensive adhesions and loculation are more common in Pfeiffer's bacillus meningitis than in other forms.

Autopsy was performed on 2 of the patients who received no chemotherapy: one was found to have an extensive hæmorrhagic bronchopneumonia, but the report on the brain has unfortunately been lost; the other had an extensive bronchopneumonia and the brain was covered from vertex to base with a purulent exudate but there were no adhesions or loculation. Case 1, which received inadequate chemotherapy, was found to have a purulent exudate over vertex and base with extensive adhesions between brain and dura, but no extracranial lesions.

Of the 15 adequately treated, 8 came to autopsy; 3 (cases 4, 9 and 16) showed no lesions other than a non-loculated purulent exudate over the surface of the brain. Case 14 presented a similar picture but there were petechial hæmorrhages throughout the brain with patchy areas of bronchopneumonia in the left lung. Case 10 had, in addition to the purulent exudate, extensive œdema and congestion of the brain with bilateral basal hypostatic congestion of the lungs. The remaining 3 cases all had an acute internal hydrocephalus, case 8 with clear fluid in the ventricles, cases 2 and 6 with pus; purulent exudate stretched from vertex to base in each brain. Case 8 had no other lesions; case 2 had pneumonic patches in the lungs but no other lesions and no loculation in the meninges save the ventricles. Case 6, however, showed extensive loculation. He had had a ventricular puncture 5 days before death on the 37th day of disease, and there was an epicranial abscess with pus in the needle track leading to a large collection of pus in the subdural space, walled off by thick fibrinous adhesions. There were three other separate loculi of pus, with thrombosis of the transverse and longitudinal sinuses, and a large hæmorrhagic and œdematous mass of brain tissue, resembling a glioma, in the region of the left optic thalamus. There were no extracranial lesions.

Thus in all cases coming to autopsy the causes of death lay in the cranial cavity, and only in the minority were there loculations of pus that would be uninfluenced by chemotherapeutic attack. In the cases which did not come to autopsy, there was no clinical evidence to suggest that they would differ much from those described. The number of extracranial lesions is unusually small and suggests that chemotherapy, ineffective against the meningitis, may have kept at bay the secondary invaders. Chemotherapy was clearly unable to clear up the intracranial infection.

DISCUSSION

The failure of chemotherapy in these cases may be explained either on the grounds that the organisms were insusceptible or on mechanical grounds. The mechanical factor was the main cause of failure of the intrathecal injections of specific antiserum in the early cases treated by Fothergill and Ward (1932), for all the cases seen at autopsy had collections of pus localised by fibrinous barriers through which the antibodies could not penetrate. Similar findings would have explained the inactivity of the sulphonamides, but in this series loculation was not a common pathological finding, nor was it suspected clinically. The explanation seems to be that the sulphonamides used had no direct or indirect lethal action on Pfeiffer's bacillus. The evidence here presented goes to show that sulphanilamide, sulphapyridine and sulphathiazole were quite ineffective, most of the patients showing no clinical or pathological response to them; and there is nothing to suggest that they played a decisive rôle in the cases that recovered. Though they were given early, in adequate dosage and with the proper ancillary treatment, save that complement and antiserum were not available, they did not affect the fatality in the children under the age of 2 years. On one occasion organisms were grown from the CSF of a child who had had chemotherapy for 3 days and whose CSF concentration of sulphapyridine was 12·5 mg. per 100 ml.

An organism known to be so capricious in its nutritional requirements as Pfeiffer's bacillus should be vulnerable to chemotherapeutic attack, but for the present the main bulwark of treatment must still be repeated spinal drainage. Though Banks (1938) has questioned its advisability in meningococcal meningitis and cases of Pfeiffer's bacillus meningitis are recorded as recovering without it ((Jacoby 1941), and though it was not used in the cases which recovered in this series, it remains true that the only common feature in most of the reported cases of recovery is repeated drainage of the meninges.

Some success is reported after the use of specific antiserum and complement (Fothergill 1937) given intrathecally. The antiserum is not available in this country,

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so there remains the possibility of using intrathecal complement in conjunction with chemotherapy. Complement is normally absent from the CSF and is always absent in influenzal meningitis but is present in other forms of purulent meningitis; its administration, either alone or with chemotherapy, seems to be useless since there is no diminution in the mortality figures (Aleman 1940). It may well be that when an efficient agent is found its mode of action may differ from that of the sulphonamides. There is some evidence that, unlike other forms of meningitis, Pfeiffer's bacillus meningitis resolves —when it does—by bacteriolysis.

SUMMARY

A series of 24 cases of meningitis due to Pfeiffer's bacillus are reported, 20 receiving sulphanilamide, sulphapyridine or sulphathiazole, or a combination of these drugs.

The fatality under the age of 2 years was 100%; in 3 of the 4 children over that age who recovered, the recovery did not seem to be due to the chemotherapy.

I wish to thank Prof. C. Bruce Perry for his help; Dr. B. A. Peters and Dr. R. H. Parry for permission to quote the cases from Ham Green Hospital; and Dr. Martin Skelton for his advice.

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RESPONSE OF PFEIFFER'S BACILLUS MENINGITIS TO SULPHAPYRIDINE

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IN view of the discussions on the effect of sulphapyridine on the course of Pfeiffer's bacillus meningitis, the following 4 cases may be of interest.

CASE 1.—A girl of 3 years had been restless during the night before admission and had developed head-retraction. Temperature 100·4° F., pulse-rate 132; respirations 30. She was restless and semiconscious, with head-retraction, neck-rigidity, staring eyes, and bilateral positive Kernig's sign. There was neither photophobia nor rash. Lumbar puncture produced a rather turbid fluid under increased pressure: cells 1200 per c.mm., chiefly lymphocytes; gram-negative bacilli seen in the direct smear, but culture grew only staphylococci and diphtheroids which were probably a contaminant. Lumbar puncture was repeated 3 days later and produced a very turbid fluid under increased pressure, containing 4000 cells; neutrophils 60%, lymphocytes 40%. Many gram-negative bacilli were seen in the direct smear and culture produced a heavy growth of Pfeiffer's bacillus, *Hæmophilus influenzæ*. Treatment: free fluids by mouth; sulphapyridine, 3 g. given on first day; then 4·5 g. daily for three days, followed by 3 g. daily for three days, 4·5 g. daily for eighteen days, 7·5 g. for one day and 4·5 g. daily for eight days. Finally, 6 g. of sulphapyridine was given daily for fifteen days, making a total of 245 g. in forty-nine days.

After the first ten days there seemed to be some clinical improvement, but this was only partially maintained, since the cervical rigidity and pyrexia persisted though the CSF became sterile. Four days later lumbar puncture was repeated one intervertebral space higher up and this produced a positive culture. For the next twenty-five days her condition remained stationary, the pyrexia becoming irregular, but with a persistently high pulse-rate. During this time she developed a swelling the size of a man's fist at the site of the first lumbar punctures. The fluid aspirated from this grew Pfeiffer's bacillus. A blood-transfusion of 290 c.cm. was given but the patient's condition deteriorated, the temperature became subnormal, and she died ten days later.

CASE 2.—A boy, aged 8 years, was admitted with a history of lassitude and evening temperature for three days and headache and vomiting for one day. Temperature 101° F., pulse-rate 144; respirations 28. He was irritable and semi-comatose. Cervical rigidity was present and a bilateral positive Kernig's sign. Lumbar puncture produced a turbid fluid at a pressure of over 300 mm. of water, and containing 12,900 cells per c.mm., of which 90% were polymorphs; protein 240 mg. and chlorides 690 mg. per 100 c.cm.; no reduction of Fehling's solution; very few gram-negative bacilli were seen in the direct smear, but culture produced a growth of Pfeiffer's bacillus. Treatment: intravenous saline; an average of 2–2½ pints in 24 hours was given by drip and supplemented by fluids by mouth. Sulphapyridine, 1·5 g., was given intravenously in the saline drip, followed by 0·75 g. 4-hourly, making a total of 27 g. in 7 days. The patient gradually improved and the signs of meningitis disappeared. A second lumbar puncture, 7 days after the first, produced a colourless almost clear fluid at a pressure of 90 mm. of water; cell-count 45 per c.mm., lymphocytes 92%; protein 40 mg., chlorides 695 mg. per 100 c.cm.; Fehling's solution poorly reduced; no organisms seen; culture sterile. The child was discharged three weeks later completely recovered.

CASE 3.—A boy, aged 4½ years, was admitted with one day's history of headache and vomiting. Temperature 104° F., pulse-rate 140 and respirations 30. He was semi-comatose, delirious and very restless, with some head-retraction and much photophobia. Neck very rigid; bilateral positive Kernig's sign and positive Brudzinski's sign; knee-jerks and ankle-jerks absent. Plantar reflex flexor, and discs normal. Lumbar puncture produced a clear fluid at a pressure of over 300 mm. of water; cells 380 per c.mm.; numerous gram-negative bacilli seen in direct smear; culture produced a profuse growth of Pfeiffer's bacillus. Treatment: free fluids by mouth; sulphapyridine, 1 g., was given at once, and then 0·75 g. 4-hourly. The child was extremely restless next day and lumbar puncture was again performed; fluid turbid at a pressure of 150 mm. of water; 2500 cells per c.mm.; numerous bacilli seen in direct smear. The discs became very engorged, and restlessness and delirium continued despite a further lumbar puncture and the intramuscular injection of phenobarbitone gr. ½. He died the same day.

At autopsy a large plaque of pus was found over both cerebral hemispheres, very little being seen at the base. The brain was much engorged. Two small areas of necrosis were present in the liver.

CASE 4.—A boy, aged 10 months, had been irritable for four days, having had one convulsion, after which he became sleepy, resenting movement. The mother had noticed that his neck was becoming stiff; he had not vomited. On admission, on Dec. 15, 1941, the temperature was 104° F.; pulse-rate 152; respirations 72. His fontanelle was bulging and he was quiet and drowsy, with an occasional meningitic cry. There was considerable neck-rigidity and bilateral positive Kernig's sign. Lumbar puncture was performed at once; the fluid was turbid at a pressure of 110 mm. of water; cells 1800, 79% polymorphs; protein content 125 mg. per 100 c.cm.; no sugar. Pfeiffer's bacillus grown from the fluid. Treatment: free fluids by mouth; sulphapyridine, 0·5 g., 4-hourly. The child improved rapidly. Next day the cerebrospinal fluid showed no change. On Dec. 19, the temperature was 100° F., pulse-rate 160, respirations 56. Sulphapyridine reduced to 0·375 g. 4-hourly for two days and then 0·25 g. 4-hourly. The child began to vomit, so sulphathiazole was given; this change checked the vomiting. A throat swab on Dec. 20 grew many pneumococci but no Pfeiffer's bacilli. On Dec. 23, lumbar puncture: pressure 100 mm. of water; cells 290, 82% polymorphs; no organisms seen; culture sterile. On Dec. 24 the child was clinically well; temperature 99·6° F.; pulse-rate 140; respirations 30. Two days later there was a sudden rise of temperature to 104·6° F.; the fontanelle was slightly full, but no meningitic signs were apparent. Lumbar puncture produced a turbid fluid at a pressure of 105 mm. of water; cells 3300, polymorphs 60%; many gram-negative bacilli seen; culture grew Pfeiffer's bacillus. Sulphapyridine, 0·5 g., given 4-hourly for three days; then changed to sulphathiazole 0·25 g. 4-hourly. On Jan. 1, 1942, the child was quite well; temperature 98° F.; pulse-rate 112; respirations 28. Lumbar puncture was attempted twice but was unsuccessful. On Jan. 14 sulphon-

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amides were discontinued. The child was discharged on Feb. 6, when he was quite healthy and gaining weight.

DISCUSSION

With the high dosage used in these cases the danger that crystals of the sulphonamide will be precipitated in the renal tract is considerable; fluids were therefore pushed. In the case given drip therapy (case 2) the fluid requirements were estimated on the basis of 2½ oz. per lb. of body-weight. Sodium bicarbonate, gr. 10, given with each dose of sulphapyridine, helps to prevent vomiting, and should in theory help to prevent the precipitation of acetyl crystals in the urine.

The first case is interesting in view of the unusually protracted course of the disease. Whether or not this was due to the intensive sulphapyridine therapy is impossible to say. The temperature was never any guide to the child's condition, since it often fell to normal only to rise a day or two later. The pulse-rate was high throughout and seems to be a more reliable guide to prognosis; this was borne out in case 4, where the pulse-rate remained high, despite the drop in temperature, returning to normal only after the relapse when the child made an uninterrupted recovery. The development of an abscess at the site of the lumbar puncture is unusual and may perhaps be considered another risk of too often repeated lumbar punctures. The second case, although interesting in view of the rapid recovery, does not conclusively indicate the value of sulphapyridine, since the infection, judged by the scanty bacilli in the CSF, was in any case not severe. Recovery might therefore have been spontaneous although Fothergill and Sweet[1] in a series of 78 cases found only one case of spontaneous recovery. The third case was obviously a severe infection from the start, and the absence of somatic resistance, shown by the low cell-count in the CSF at the first lumbar puncture, might well have accounted for the failure to respond to treatment. The fourth case produces definite evidence that sulphapyridine has a favourable effect on the course of the disease. Spontaneous recovery in a child under a year is unknown, and the rapid recovery in this case was striking. The cause of the relapse is obscure, particularly after the CSF had become sterile. Further, infection from the nasopharynx seems to have been eliminated; it was possibly due to the breaking down of a loculus which flooded the cerebrospinal system with pus. It is suggestive that it should have occurred a day after stopping the sulphapyridine. The rapid recovery after further sulphapyridine therapy is significant.

The number of cases described is too small for any precise conclusions to be drawn, but from this brief experience the best form of treatment seems to be: (1) Diagnostic lumbar puncture, to be repeated only if restlessness and irritability become uncontrollable by any other means or when the fluid might be expected to be sterile (i.e., when the clinical condition has much improved). The concentration of the sulphapyridine in the CSF should be as high as possible, and repeated lumbar puncture can only serve to reduce the concentration. (2) Large doses of sulphapyridine should be given—never less than 3 g. in 24 hours—and reduced doses should be given for at least a fortnight after meningitic symptoms have disappeared. (3) Fluids should be pressed in order to prevent renal complications. Dehydration and vomiting are best combated by intravenous drip salines and this provides a convenient method for the administration of sulphapyridine.

SUMMARY

Four cases of influenzal meningitis are described, 2 of them—one in a child aged 10 months—recovering.

Sulphapyridine seems to be worth a trial in all cases, since favourable effects on the course of the disease were noticed in 2 cases out of 4.

The dose should be large and should be continued after all meningitic signs have disappeared; fluids should be pressed.

I wish to thank Dr. Wilfrid Sheldon and Dr. Philip Evans for permission to publish these cases.

1. Fothergill, L. D. and Sweet, L. K. *J. Pediat.* 1933, 2, 696.

TETANUS IN THE IMMUNISED SUBJECT

H. BATHURST NORMAN, GM, DM OXFD, MRCP
MAJOR RAMC

TETANUS in men who have received active immunisation sheds some light on the degree of protection which such immunisation gives. There can be no doubt that a very high immunity is achieved by the routine administration of 1 c.cm. of tetanus toxoid on two occasions at an interval of 6 weeks, as was practised in the early part of the present war. Perry (1940) reported no single case of tetanus among wounded personnel in France; Smith (1941) in a large series of casualties, a number of whom had returned from Dunkirk, did not see a case of tetanus. According to Bensted (1940) only 8 cases were reported from the British Expeditionary Force in France during the period 1939–40, all in men who had not been actively immunised. Boyd and Maclennan (1942), who have reviewed the incidence of tetanus during the first two years of war in the Middle East, record 5 cases in actively immunised subjects. In 2 of these the infection was fulminating and associated with the presence of much necrotic tissue in wounds; in the remaining 3 cases there was apparent lack of response to immunisation with the two routine doses of formol toxoid. They emphasise the value of a third or "boosting" dose given at an interval of twelve months after the second inoculation. This procedure has now been adopted as the routine practice in the British Army; but at the present time the proportion of men inoculated with the more recently introduced third dose is small. Evidence of the need for a boosting dose is provided by the following case.

CASE-HISTORY

A soldier aged 27 was admitted to hospital on Nov. 13, 1942. He had been complaining of increasing pain and stiffness in the back for 4 days. There had been septic sores on both legs for 14 days before admission, several of which had scabbed over. He had been inoculated with 1 c.cm. tetanus toxoid prophylactically on Nov. 18, 1940, and again on Jan. 13, 1941. Pain began in the lumbar region, at first in spasmodic attacks. The attacks gradually increased in frequency and intensity until spasm was tonic and the pain severe and continuous. His back became arched and could not be straightened. Occasionally more intense spasms were superimposed upon the tonic contraction. No stiffness of the jaw or face muscles had been noticed.

On admission there was considerable opisthotonus with spasm of the erector spinæ muscles, more definite on the left side than the right. The abdominal muscles were rigid. All tendon reflexes were much increased and a positive jaw-jerk was elicited. There was some fibrillary twitching of the muscles of both thighs. Occasional reflex spasms were observed during the first 3 days of the illness. Neither trismus nor dysphagia was noted. The temperature and pulse were elevated during the 3 days after admission, the temperature reaching 100° F. on the second day. There were a number of septic skin lesions on both legs, some of which yielded a sanious discharge while others had healed with scab formation.

He was given 200,000 units intravenously of antitetanic serum immediately after admission. The reflex spasms were readily controlled by the administration of gr. 15 each of chloral hydrate and potassium bromide, given 4 times daily. The septic areas on the legs were treated by hypertonic saline dressings and later the application of gentian-violet 1%. No further antitetanic serum was given after the initial dose. Apart from the appearance of an urticarial rash on Nov. 21, 1942, which persisted for 2 days, recovery was uneventful.

COMMENT

Cole (1942) has pointed out that with the widespread use of antitoxic serum the type of wound that causes tetanus has been profoundly modified. The infection is now seldom seen after an obvious wound. It is more likely to appear after minor wounds or abrasions which are not sufficiently serious to demand medical attention, so that prophylactic antitetanic serum is not given. Active protection by means of tetanus toxoid should prevent the development of these cases associated with insignificant trauma.

A case of tetanus in a soldier who had earlier received two injections of protective toxoid emphasises the

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wisdom of giving renewal doses at twelve-monthly intervals which is the procedure recommended in the Army.

I wish to thank Colonel A. D. Stirling for permission to publish this case.

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Reviews of Books

Statistical Analysis in Biology

K. MATHER, DSc, PhD, head of the genetics department. John Innes Horticultural Institution, London. (Methuen, Pp. 247. 16*s*.)

THIS exposition of modern statistical methods is not easy reading but should prove useful to workers who are not daunted by algebraic manipulation and elementary differential calculus. In short, starting with simple problems in probability and the characteristics of frequency distributions it deals with the various tests of significance used by the statistician, with degrees of freedom and the analysis of variance, the factorial design of experiments (and other methods), linear and polynomial regression, correlation technique, and methods of estimation. A great deal is, therefore, compressed into a relatively short space. The book is well illustrated by examples, naturally drawn mainly from the field of genetics, and as the author emphasises in his preface it is only by working through these that most readers will learn what is being done, how it is being done and why, and be ready to apply the methods to their own material. There is no short cut to understanding and using them but plenty of hard work aided by such a guide as this.

Hemorrhagic Diseases and Physiology of Hemostasis

ARMAND J. QUICK, PhD, MD, associate professor of pharmacology. Marquette University, Wis. (Baillière. Pp. 340. 27*s*. 6*d*.)

THIS comprehensive monograph gives a clear account of the physiology of the coagulation of the blood and of current ideas on the primary hæmorrhagic diseases. The author adopts Morawitz's classical theory of coagulation—even though it leaves many problems unsolved—because it is the best "skeleton framework" for the known facts; and having done this he does not try the reader's patience by detailing all the other theories and discussing their shortcomings. This physiological section, occupying a third of the book, is illumined by reference to the history of the subject and by some interesting comparisons with clotting mechanisms in other forms of life. Quick is best known for his work on prothrombin and his methods for estimating prothrombin in blood. He gives his own work its proper place—but no more—and presents a convincing defence of his relatively simple one-stage technique, producing good evidence for its retention in place of the very elaborate two-stage method that is said to be more accurate. He also points out that modifications in which snake venom and lecithin are used only achieve the same object as his method by a roundabout way. The section on pathology gives excellent clinical pictures with a full account of the growth of our knowledge of each disease, its mechanism (or the theories about its mechanism) and its treatment. The purpuras, the hereditary hæmorrhagic diatheses, "afibrinogenemia," and hæmorrhage in avitaminosis K are discussed. In a useful account, "pseudo-hæmophilia"—a definitely hereditary syndrome affecting females as well as males—is defined and put in its proper place. Hæmophilia itself is given a comprehensive separate chapter. The book ends with a classification, a discussion of differential diagnosis, and an appendix on technique. In spite of the fact that so much ground is covered, and that published work is thoroughly quoted, this balanced account of a somewhat confused subject is relatively short and Dr. Quick has succeeded in making it readable.

Introduction to Industrial Mycology

(2nd ed.) GEORGE SMITH, MSc, AIC, research demonstrator, department of biochemistry, London School of Hygiene and Tropical Medicine. (Arnold. Pp. 260. 20*s*.)

THE control and prevention of mould growth is important in industry because moulds spoil almost all organic materials. Leather, textiles and wood are attacked as well as foodstuffs, and in the laboratory the effect of moulds on museum specimens and on culture media is well known. But moulds have also great powers of synthesis and many of them have been harnessed for useful purposes. Thus, citric acid can be obtained commercially as a fermentation product of some species of aspergillus, while gluconic and gallic acid, glycerol and fats may all be formed in considerable quantities by moulds. These and many more little-known properties of the moulds are discussed in this book which is already justly popular. The author first describes each of the species of mould used in industry and follows with chapters on laboratory technique, the physiology of fungi and the control of mould growth. Beginners will appreciate his systematic classification and his simple language. This edition includes a new chapter devoted to the true and non-sporing yeasts and a new key for the hyphomycetes. Paper shortage has made it necessary to print the 136 beautiful photo-micrographs on both sides of the page. The book is addressed primarily to those who meet problems connected with moulds in industry, but it may be read with pleasure by anyone interested in biology.

Synopsis of Allergy

HARRY L. ALEXANDER, MD, professor of clinical medicine, Washington University, St. Louis, Mo. (Kimpton. Pp. 246. 15*s*.)

To those struggling with the continual increase of publications and observations on allergy, and the growing size of volumes on the subject, a small handbook such as this will come as a relief. The editor of the *Journal of Allergy* has lucidly summarised his subject and outlined modern trends. A quarter of the book is devoted to a general consideration of allergy, the rest to individual manifestations, especially bronchial asthma, hay-fever and the allergic dermatoses. An appendix deals with the preparation of extracts, the methods of skin-testing, the pathological investigations necessary in allergic cases, together with recipes for elimination diets, and even a list of household materials and foods and the allergens they may contain. The less common allergies, such as the gastro-intestinal upsets and headaches, are perhaps dealt with a little too briefly. The subject matter is presented more for the practitioner than the specialist, and sets out modern views ably.

Mass Miniature Radiography

Wing-Commander R. R. TRAIL, MD Aberd., FRCP; Squadron-Leader H. J. TRENCHARD, MB Birm., MRCP; Flying-Officer J. A. KENNEDY, MB Lond. (Churchill. Pp. 96. 8*s*. 6*d*.)

THIS little book has appeared at a propitious time for those about to undertake mass radiography for civilians. The authors' experience of the method is based on an examination of some 150,000 cases in the Royal Air Force. They describe clearly and in sufficient detail their methods of conducting a large-scale chest survey, but the results are not dealt with in this volume. The first few chapters cover administration, staff, building and technical equipment. Then follows a description of the procedure from the moment the subject enters the door until his final dossier is complete. The final chapters deal with interpretation of miniature films and the disposal of suspect cases. Different and more complicated problems will arise in the disposal of suspect civilian cases, but this chapter will prove a useful guide even there. The chapter on interpretation contains some useful tips on the identification of radiographic features which are exaggerated or minimised on the small film. One small error needs correction. The impression is given that one lung appears more translucent than the other in the miniature film. This effect is due to the type of grid used and is by no means an inherent feature of the miniature film.

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THE LANCET

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IMPETIGO

IT is customary to recognise two kinds of impetigo, the bullous impetigo of infancy and the impetigo contagiosa of TILBURY FOX. Bullous impetigo is now generally accepted as a staphylococcal infection; it is highly contagious and has lately been more than ordinarily prevalent in nurseries, fortunately in a mild form. Although ALMQUIST recognised distinctive cultural characters in the causal staphylococcus, recent work has failed to confirm his claims, and it seems that the usual source of infection is a staphylococcal skin lesion in mother or attendant. The cause of impetigo contagiosa, which is commonest at school age, is more doubtful. A mixed infection with hæmolytic streptococci and staphylococci is a common finding in the crusting lesions of some days' duration; and bacteriological opinion has on the whole favoured *Streptococcus pyogenes* as the primary infecting organism.

Since the outbreak of war impetigo has been troublesome among troops, and interest has again been focused on its ætiology and treatment. In our present issue two independent groups of Army investigators give reasons for concluding that impetigo in the adult is due to *Staphylococcus aureus*. This organism was recovered from the lesions of about 95% of their cases, whereas *Str. pyogenes* was present in only 25 to 38%. Even more significant was the almost constant occurrence of *Staph. aureus* in pure culture in the fluid of the primary blister, while the hæmolytic streptococcus, very rare in the early bulla, showed a rising incidence in the older crusting lesions. As BIGGER and HODGSON remark, the increase in streptococcal infection with advancing age of the lesion was strikingly similar to that seen in burns or open wounds, and there seems to be little doubt that in their cases the streptococcus was a secondary invader. These workers largely failed to reproduce typical impetigo by inoculation of vesicle fluid or staphylococcal culture on the skin of volunteers. SHEEHAN and FERGUSSON, however, were more successful, the best results—varying from an aborting vesicle to full impetigo—being secured by rubbing vesicle fluid into scarified areas of skin. Similar lesions were obtained, though less constantly, with cultures of *Staph. aureus*, but inoculation of *Str. pyogenes* and *Staph. albus* did not reproduce the disease. Strains of *Staph. aureus* other than those isolated from cases of impetigo were not tested.

These findings afford pretty conclusive proof of the staphylococcal origin of impetigo as seen in adults, and are apparently at variance with the evidence in favour of a primary streptococcal infection. A possible solution to this conflict is offered by EPSTEIN,[1] who learned in the clinic of LEWANDOWSKY and JADASSOHN in Breslau that there are two varieties of impetigo, which with a little experience can usually be differentiated. Streptococcal impetigo, he says, is characterised by an evanescent vesicular stage followed by thick stuck-on honey-coloured crusts with an erythematous sodden zone around the lesion; it is mostly seen in children and has its maximum incidence in the autumn. Staphylococcal impetigo is primarily, and more persistently, bullous, with, later, thin flat varnish-like crusts and a clean base; but the staphylococcal lesion may by secondary infection assume more of the characters of streptococcal impetigo. It is commonest in adults and older children, and prefers the heat of summer. Obviously, more data are needed to show how far this reconciliation of conflicting bacteriological findings fits the facts. Among predisposing factors, irritation by exposure to the sun and abrasions of the skin (as from shaving) are probably important; but we still know too little about this, or about the contagiousness of the infection.

On the treatment side, most workers agree that impetigo is a self-limiting disease and that the lesions, if protected and rested, will heal spontaneously in 7–10 days. SHEEHAN et al., using different remedies for similar lesions in the same patient, decided that a compound sulphathiazole paste was the best means of accelerating healing, and that sulphanilamide (in ointment or cream), gentian-violet, and ung. hydrarg. ammon. were much less effective. The results seemed to be the same whatever kind of organism was present. Other workers have testified to the superiority of sulphathiazole, no matter what the excipient. Indeed HARRIS,[2] using a drop or two of a 20% suspension of the new "microcrystalline" sulphathiazole on a gauze dressing, claims cure of the lesion in 24 hours. Such accelerated healing would be a great help to the Services. Unfortunately the possibility of inducing hypersensitivity to the drug cannot be ignored.[3]

1. Epstein, S. *Arch. Derm. Syph.* 1940, 42, 840.

SEA-WATER AND BLOOD

THE famous doctrine of MCCALLUM[4] that the blood of higher vertebrates is the evolutionary descendant of sea-water is, within narrow limits, a truism. Life depends on the existence of a menstruum or ground-fluid not very different from sea-water either in ionic composition (Na^+, Cl^-, K^+, Ca^{++}, Mg^{++}) or in gross ionic proportions (high Na^+, Cl^-; lower K^+; Ca^{++}, Mg^{++} lower still). Protoplasm without, for example, calcium, "is unthinkable"[5]; "if a marine composition of the internal medium in this restricted sense did not exist, then it would seem necessary for the organism to invent it."[6] It is therefore profitless to read an esoteric significance into the affinity between sea-water and blood; biologists are better occupied in finding out more and more reasons why the composition of the body-fluids cannot, in fact, be much different from what it is.[7] It was HENDERSON[8] who first led us to this bald pragmatic solution of the problem of "fitness" and adaptation, and who showed, by reasoning similar to this, that the sea is just as fortunately "adapted" to the vital workings of the organism as the organism is to the sea.

MCCALLUM maintained that, primitively, the body-fluids of marine animals were in equilibrium with sea-water, and that the present composition of mammalian blood is closely similar to that of the

2. Harris, T. N. *J. Amer. med. Ass.* Feb. 6, 1943, p. 403.
3. *Ibid*, pp. 406, 408 and 411.
4. *Physiol. Rev.* 1926, 6, 316.
5. Pantin, C. F. A. *Biol. Rev.* 1931, 6, 459.
6. Conway, E. J. *Proc. R. Irish Acad.* B, 1943, 48, 161.
7. cf. Hogben, L. Nature of Living Matter, London, 1930.
8. Fitness of the Environment, New York, 1913.

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Paleozoic sea when the vertebrates left it and their blood became, in a physicochemical sense, shut off from it. Brilliant and stimulating as it is, his theory has not been accepted by either biologists [2] or geochemists.[3] In the first place, even the body-fluids of the majority of marine *in*vertebrates are not in passive equilibrium with sea-water—the concentration of H^+ and K^+ is higher than in the sea, and that of Mg^{++} and SO_4^{--} lower. Still less is it true of vertebrates—the fresh-water teleost has to work to prevent itself swelling up and bursting, the marine teleost to prevent itself being desiccated. True, the cartilaginous fish have bloods isotonic with sea-water, but the greater part of their osmotic debt is paid in organic currency—urea. There is no evidence that the blood of vertebrates was ever in passive equilibrium with sea-water. Given a working excretory mechanism constantly depleting the internal medium, PANTIN [2] believes that the essential difference between the ionic proportions of blood and sea-water (the relatively high K^+ and low Mg^{++}) can be explained by the differences in the mobilities of the ions and the rate at which they therefore pass across natural membranes from the outside. These differences in mobility will be exaggerated by the negative charge carried by most natural membranes.[9]

The geochemical evidence is no more reassuring. The essential feature of MCCALLUM'S theory is that in Ordovician times or thereabouts the sea had the salt concentration of present-day mammalian blood and that it has been getting steadily salter since (the salt being of volcanic origin, or being carried into the sea by the rivers as a result of rock erosion). In fact, however, large salt deposits are known in strata dating from Cambrian, Permian-Trias and Miocene times, and there is nothing to suggest that they are the products of the drying up of different types of sea. CONWAY [3] has tried to calculate the salt concentration of the Paleozoic sea on the grounds of two extreme hypotheses: (*a*) constant ocean-volume and chloride content; (*b*) constant ocean-volume with chloride of volcanic origin. The estimates for the Cambrian-Ordovician epochs do not differ greatly: the salt concentration is still about three times that of mammalian blood, and the concentration of magnesium is higher than that of potassium. He is, in short, led to dismiss MCCALLUM'S views as "superficial evolutionism." Sea-water and the blood of mammals are fundamentally similar because that's the way things are; we must become sophisticated enough to realise that this interpretation is not nearly as silly as it sounds.

VITAMIN B_1 AND SHOCK

THE war has led to the study of vitamins from new angles. For example, vitamin C has been shown to decrease the mortality of guineapigs subjected to a trauma,[10] and to prolong the life of cats which have been bled—possibly by increasing the availability of oxygen to the tissues.[11] Vitamin B_1 also has been shown by GOVIER and GREER [12] to prolong the life of exsanguinated animals, and to diminish the disturbances in carbohydrate metabolism following hæmorrhage. In their first experiments they removed rapidly about a third of the circulating blood from dogs anæsthetised with ether. The animals, which received intravenous and intramuscular injections of vitamin B_1 immediately after bleeding, survived on the average for 8 hours, whereas those that were not treated with the vitamin, died after some $3\frac{1}{2}$ hours. This difference was shown to be statistically significant, but the figures show that the control group was bled to a somewhat greater extent than the vitamin-treated group.

In a second paper,[13] GOVIER and GREER reported that administration of vitamin B_1 lowers the level of keto-acids, sugar and lactic acid in the blood of dogs which have been bled. As these observations were made in animals locally anæsthetised, they concluded that the beneficial effects reported in their previous paper could not be due to the complete or partial annulment by the vitamin of the harmful effects of the ether. The rise in lactic acid seen after hæmorrhage is not of significance; but the importance of the increased quantities of keto-acids is more difficult to assess. It is not clear why there should be a need for vitamin B_1 after hæmorrhage in a healthy well-fed dog: GOVIER and GREER suggested that bleeding may lower in some way the thiamin level of the tissues generally. More recently GOVIER [14] has described his studies on the relationship between the plasma level of vitamin B_1 and the resistance to shock after hæmorrhage. He found that to produce a permanently lowered blood-pressure dogs having a high plasma-thiamin (4γ per 100 c.cm. and above) must be bled some 45% more than those in which the plasma-thiamin is low (0–2γ). When dogs were fortified with vitamin B_1 before bleeding, their blood-pressure tended to return to normal after hæmorrhage, whereas animals deficient in vitamin B_1 developed persistent hypotension soon after the loss of small amounts of blood. The incidence of intestinal hæmorrhage after bleeding was much greater in animals deficient in B_1 than in those with high plasma-thiamin levels; and, finally, the plasma-thiamin rose as the blood-pressure fell. These experiments seem to show that vitamin B_1 increases the resistance of animals to the effects of hæmorrhage, and GOVIER discusses some possible explanations. Hepatic glycogenolysis and hyperglycæmia after hæmorrhage will increase the quantities of keto-acids produced in the intermediary stages of carbohydrate metabolism, for the complete oxidation of which increased quantities of vitamin B_1 will be needed. In their absence the metabolism of the predominantly carbohydrate-burning tissues may be interrupted, resulting in impairment of function. The intestinal hæmorrhage may be due to constriction of the hepatic veins,[15] or to swelling of the polygonal cells of the liver.[16] Against constriction of the hepatic veins, vitamin B_1 might be of benefit by reinforcing acetylcholine—if indeed this has a dilator action on them. Or it might have some protective influence on the liver cells.

Before the true value of vitamin B_1 in shock can be assessed the work of GOVIER and GREER will need confirmation. At best, vitamin B_1 can be only an adjuvant to transfusion, and before its general use is contemplated answers must be found to several questions. Why is there a greater need for vitamin B_1

9. cf. Baldwin, E. Comparative Biochemistry, Cambridge, 1940.
10. Ungar, G. *Lancet*, 1943, 1, 421.
11. Stewart, C. P., Learmonth, J. R., Pollock, G. A. *Lancet*, 1941, 1, 818.
12. Govier, W. M., Greer, C. M. *J. Pharmacol.* 1941, **72**, 317.
13. *J. Pharmacol.* 1941, **72**, 321.
14. Govier, W. M. *Ibid*, 1943, **77**, 40.
15. Lamson, P. *Ibid*, 1920, **16**, 125.
16. Bainbridge, F. A. and Trevan, J. W. *J. Physiol.* 1917, **16**, 460.

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after hæmorrhage, and how does it exert its beneficial effect? Does it have this effect in shock other than that following hæmorrhage? Does it have the same beneficial effect in man as in animals? Are the reserves of vitamin B_1 in the well-nourished normal person insufficient to meet the needs of the body after hæmorrhage?

Annotations

SULPHONAMIDES BY UNFREQUENTED ROUTES

In the early days of sulphonamide therapy, a saturated solution of sulphanilamide (0·8% at body temperature) was given subcutaneously and intrathecally in the treatment of several small series of meningococcal meningitis.[1] This method soon fell into abeyance when it was shown both experimentally[2] and in humans[3] that administration by mouth was equally effective. Parenteral administration of the sulphonamides is difficult because of their low solubility in water. An effective dose requires large volumes of solution; thus in order to administer 1 g. of sulphanilamide about 125 c.cm. of the solution must be given. The sodium salts of sulphapyridine, sulphathiazole and sulphadiazine are more soluble, but their extreme alkalinity makes them so irritating that they too must be highly diluted if they are to be injected into subcutaneous tissues. Recently, however, there has been a tendency to revert to the subcutaneous route, particularly as a postoperative measure, using a very dilute solution. This method has now been investigated in 160 cases by Taplin and his colleagues,[4] and in 19 cases blood-concentration curves have been followed up for 50–70 hours after the initial administration. The solutions found most useful were made by adding to 1000 c.cm. of sterile normal saline 5–7 g. of sodium sulphapyridine, 7·5–8 g. of sodium sulphathiazole, or 5 g. of sodium sulphadiazine. The pH values of these solutions were about 10·0, 9·5 and 9·2, but in spite of their decided alkalinity they caused no local reactions when injected under the skin. The solutions were injected into both thighs by continuous drip over periods of from two to five hours—a procedure sometimes called hypodermoclysis. This would only be possible in adult patients with a reasonably good circulation. When sulphapyridine was employed the maximum blood concentration was reached six hours after the first clysis was started; with sulphathiazole the peak was at five to eight hours, and with sulphadiazine at four to eight hours. The maximal values reached showed decided variations, from about 4 to about 16 mg. per 100 c.cm. They were, on the whole, lowest for sulphathiazole and highest for sulphadiazine, a finding to be expected from the known rates of absorption and excretion of these two drugs. In order to prevent the blood concentrations from falling to a dangerously low level, it was necessary to repeat the clysis not later than sixteen hours after the first subcutaneous dose in the case of sulphapyridine and sulphathiazole, and after about twenty hours in the case of sulphadiazine. Since the blood-concentration values are not predictable, it is thought necessary to estimate them between four and eight hours and again between fourteen and eighteen hours after treatment has been started. This makes the method rather cumbersome, and for routine work it cannot compete with the oral method, but it might usefully be employed, for example, when the patient cannot or will not coöperate, where there is persistent vomiting, and after operations, particularly operations on the mouth. A potential danger is the production of œdema of the lungs, and in its present form the method should not therefore be applied in pneumonia.

Other novel routes of administration of sulphonamides are now being proposed, following on the method developed by Chambers and his associates[5] for producing "micro-crystals" of the drugs. It is possible to prepare a stable, neutral, aqueous suspension, resembling cream of magnesia in physical properties, which can be injected through fine hypodermic needles, poured into the interstices of wounds, or sprayed to form a sulphonamide "fog" in the air. Thus Harris and others[6] have administered a sulphathiazole mist by inhalation to infected mice and obtained therapeutic results comparable with those obtained with oral administration. Satisfactory blood levels were easily obtained, and absorption was considered to be from the lung rather than from the stomach, since very low amounts of the drug were afterwards found in the lungs. The dry microcrystals have also been insufflated into nasal and oral cavities as "smoke." Arnett[7] has incorporated 0·3 g. of sulphadiazine in a plug of paraffin wax, and noted the salivary sulphadiazine levels in 11 subjects who used this as a chewing-gum. At the end of two hours the levels were 33–96 mg. per 100 c.cm. of saliva, at the end of three hours they averaged 56·7 mg. and at the end of four hours 20–25 mg. per 100 c.cm. On this basis he considers a trial of the method justified in tonsillitis, pharyngitis and the like. Two or three chews per minute are sufficient, and the material may be left in the mouth throughout the night, for it is harmless if swallowed.

BEST USE OF AMPUTATION STUMP

The idea of harnessing the muscles of an amputation stump to implement an artificial limb came to Giuliano Vanghette of Turin during the Abyssinian campaign of 1896. His enthusiasm was greater than his opportunity but his fellow countryman, Prof. V. Putti of Bologna, worked at what he called kinematisation during the war of 1915–18 and addressed[8] the Royal Society of Medicine on his results. About the same time F. Sauerbruch perfected a technique of his own in Germany and Tuffier reported[9] to the Paris Academy of Medicine. In this country some 30 such operations were done by Pearce Gould, Fitzmaurice-Kelly and others. After 1921, the method fell into disuse in the old world; but in a little book[10] just published Nissen and Bergmann show that some interest has been maintained in America. The principle, in these operations, is to fix the stump muscles by plastic surgery in such a way that they can be used to activate an artificial limb or mechanical hand. Thus the arms are designed to transmit finger- and thumb-grip to the hand; and the clear text and beautiful illustrations in this book show how it can be done. But it must be borne in mind that a pull power of 24 lb. developed at the level of muscle transfixion becomes only about 6 lb. at the hand, and even this cannot be sustained. Thus, as Nissen and Bergmann agree, only light occupations are open to such patients and the operation determines in advance the limitations to which he will be subjected.

In this country attention has been directed less to plastic surgery than to the design and perfection of appliances, activated in some cases from the shoulder. These limbs can undertake all the movements, both fine and coarse, achieved by the mechanical hand, and have a wider range of service; thus patients can at will change from light clerical work to heavy manual labour without needing a fresh operation or a change of limb.

1. Schwentker, F. F., Gelman, S. and Long, P. H. *J. Amer. med. Ass.* 1937, 108, 953; Eldahl, A. *Lancet*, 1938, i, 712; Willien, L. J. *J. Amer. med. Ass.* 1938, 110, 630; Crawford, T. and Fleming, G. B. *Lancet*, 1938, i, 987.
2. Proom, H. *Lancet*, 1937, i, 16. 3. Banks, H. S. *Ibid*, 1938, ii, 7.
4. Taplin, G. V., Custer, E. A. and Young, L. E. *J. Amer. med. Ass.* 1943, 121, 313. See *Lancet*, 1942, ii, 192.
5. Chambers, L. A. et al. *Amer. med. Ass.* 1942, 119, 324.
6. Harris, T. N. et al. *Amer. J. med. Sci.* 1943, 205, 1.
7. Arnett, J. H. *Ibid*, 1943, 205, 6.
8. *Lancet*, 1918, i, 791.
9. *Ibid*, 1920, i, 281.
10. Nissen, R. and Bergmann, E. Cineplastic Operations on Stumps of the Upper Extremity. (Heinemann. Pp. 88. 17s. 6d.)

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The tests of the value of any operation on a stump are its ability to stand up to the strain of limb-wearing without further surgical treatment, coupled with its functional capacity when fitted with a limb. In these two respects the ascendancy of the appliance over the mechanical hand has remained unchallenged for 20 years. In view of the arguments put forward in this book in favour of the mechanical hand it would be interesting to compare the work of a group of patients using the stump achieved by cineplastic surgery and the mechanical hand, with that of a group fitted with appliances designed for all types of work such as are used in this country. It is also worth noting that patients and their relatives often dislike the look of a stump which has been subjected to cineplastic procedures. But the fact that surgeons continue to experiment in attempts to improve the functional ability of the amputation stump is encouraging, and the experience of Nissen and Bergmann that the surgeon and the limb-maker must work in close coöperation is shared by all who have to do with patients who have lost a limb.

REHABILITATION OF THE TUBERCULOUS IN RUSSIA

IT is being increasingly realised that the skilful rehabilitation of the disabled and unfit on an individual basis well repays the study and effort it requires, and two Russian reports show that pulmonary tuberculosis is no exception in this respect. Schreiberg [1] emphasises that fitness for employment depends not only on the clinical type of the disease but also on the sanitary and technical conditions of employment, distance from residence to place of work, and family circumstances. In assessing fitness for work he has found dyspnœa, tachycardia, hæmoptysis, temperature, pain, and cough important signs and symptoms. Thus, dyspnœa does not necessarily preclude suitable employment, whereas a persistent tachycardia associated with an unstable temperature carries an unfavourable clinical and industrial prognosis; pain implies that light work would be more appropriate than heavy manual labour; while troublesome cough precludes participation in chemical or dusty trades. Berenzon [2] followed up 63 patients who had previously had unsuitable jobs and were retained in a sanatorium for an additional 6 months for training in the new trade of metal turner. Of this number, 60 were rendered fit for work with an earning capacity usually above what it had been in their old occupations. Berenzon concludes that the following types of disease are suitable for this prolonged sanatorium treatment with change of trade: infiltration in the process of absorption and induration; a limited area of fibrosis; discrete dissemination of nodules; slight and moderately diffused fibrosis with no cardiovascular symptoms; and after successful collapse therapy. The industrial factors which preclude the employment of tuberculous workers include heavy physical exertion, rapidly changing meteorological conditions, high temperatures, high atmospheric pressure, harmful gases and chemical substances, dusts, and the necessity to adopt strenuous postures while at work. He suggests that trades best suited for the purposes of re-training should not require longer than 8–12 months to learn, should not be too elaborate technically and should involve none of these contra-indicating factors, and he recommends, among others, that of turner, planer, mould-maker, cap-maker, knitting-machinist, sewing-machinist, draughtsman and accountant as being satisfactory for re-education. The detailed findings of these Russian investigations are less important in their application to our own country than the principle underlying them: that the just assessment of working capacity demands an intimate knowledge of the patient, his type of disease and aptitudes, and also a detailed insight into what his job entails. Those responsible for the rehabilitation of the tuberculous should not rely on "light work" as a convenient and comprehensive classification, but by delving deeper try to form a clear picture of the worker's environment.

1. Schreiberg, L. G. *Probl. tuberk., Moscow*, 1941, no. 4, 91.
2. Berenzon, Y. E. *Ibid*, 1941, no. 2, 103.

EVACUATION OF WOUNDED BY AIR

REFERENCES have lately been made in the press to "dual purpose" air ambulances used by United States forces in this country. These are cargo-carrying Douglas planes fitted with removable racks to hold 18 stretchers. In a combatant zone these aircraft will be employed to take troops or supplies to the forward areas, where they will be loaded with casualties needing evacuation. In this country, besides the crew of 5, they carry a sergeant of the medical department and a medical officer if required. The system is excellent and has been fully justified in the campaigns of the British Eighth Army, where transport planes have been adapted in the same way to take 18 stretchers on their return empty to the base.[1] On the other hand it is not always easy—if indeed possible—for forward medical units to release orderlies or NCOs, let alone officers, to travel back with the wounded; for it may be long before they are able to rejoin.

For the wounded there is all the difference in the world between a few hours' flying, on the one hand, and a long and perilous journey across country on the other: air transport can save many lives in these campaigns far from the base. Even air travel however has its stresses and physiological dangers: thus Lovelace and Hargreaves [2] point out that any tendency to anoxæmia (from shock, heart-failure, anæmia, head injury, or even massive sulphonamide therapy) is at once exaggerated by low atmospheric pressures, and high altitudes also lead to expansion of gases in a pneumothorax or in the intestines which may be risky. Rapid deterioration has been noticed particularly in patients who have recently been operated on.[1] For these reasons, unless a pressure cabin can be used, air ambulances are best flown below 3000 feet.

IF TYPHUS COMES

LOUSE-BORNE typhus is a concomitant and aftermath of great wars, especially those which, like this one, involve the endemic centres of Eastern Europe. Our public health authorities have therefore to be prepared for an epidemic among civilians, even though the stringent preventive measures of the Services and the vigilance maintained at our seaports and airports have so far been as successful during this war as throughout the last. Many of the major public health authorities have laid their plans, varying in detail with the character and size of the communities they serve and the resources available. The control of louse-borne typhus is essentially the control of the body- or head-louse infected with *Rickettsia prowazeki*, the causal agent of the disease, and the measures include the prompt diagnosis or provisional diagnosis of the disease, followed by the removal by special ambulance, isolation and lousing of the patient, the search for and lousing of his immediate contacts, and the disinfestation of premises vacated by the patient or inhabited by his contacts. For each of these purposes a specially trained and protected medical, nursing and sanitary personnel is essential. Admission to hospital may provide a major difficulty which turns mainly on facilities for disinfestation, since no patient may be admitted to the typhus ward until efficiently loused; and all clothing and bedding must be steam-disinfested by plant specially reserved for the purpose. Several authorities have provided one of their larger isolation hospitals with its own cleansing and disinfestation

1. *Army med. Dep. Bull.* January, 1943, p. 5.
2. Lovelace, W. R. and Hargreaves, J. *J. Aviation. Med.* 1942, 13, 2; and *War Med.* 1942, 2, 580 (abstr. *Bull. War Med.* January, 1943, pp. 299 and 300).

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station and have arranged that if an outbreak starts the hospital should be evacuated and used solely for typhus patients. The selection of nursing, ambulance and sanitary personnel is made more difficult just now by shortage of staff. Ideally, all engaged in anti-typhus work should be young healthy volunteers, for the fatality increases with age and the chances of infection are considerable. The chairman of one county public-health department has suggested that anti-typhus personnel should be on the same footing for compensation as other people engaged in civil defence. Nevertheless there is no lack of volunteers, though they may have to be drawn from older age-groups. In fairness to themselves and to the community anti-typhus personnel must be adequately instructed about the character of the disease, its nursing and the available measures of control. Nor must personal precautions be neglected. These consist in the wearing of adequate protective clothing by doctors, nurses and sanitary staff, together with facilities for change of clothing and washing. Vaccine prophylaxis is available and should always be offered, with the proviso that it is purely an accesssory measure in no way alternative to the wearing of proper garments; experience with vaccine prophylaxis in the field is not yet sufficient to allow us to judge its efficacy. In many parts of the country, volunteer mobile typhus-squads have been formed and are ready for duty in any part of their district if disinfestation of premises is required. Meanwhile, a concerted attack on the *Pediculus humanus* among the civil population would lessen the chances of this organisation being put into action, for any measure which reduces the louse population also reduces the likelihood of an epidemic of typhus—few lice, little typhus; no lice, no typhus.

PHYSIC AND PHYSICS

φύσις=the nature of a person or thing,—i.e. the natural form or constitution, as resulting from growth (Liddell & Scott).
φυσική=the knowledge of nature (OED).

THE British Association of Physical Medicine is to be born again next Wednesday. A society with this name was inaugurated in London on Jan. 27, 1938, with the primary object of coördinating under one control the various branches of physical medicine.[1] The aim was good but apparently not well-timed. It has now been revived (see p. 572), with a different emphasis and the urge of the time behind it. For the object of the new association is to implement a concept which includes the achievement and maintenance of physical fitness, the selection and training of recruits for the battle of life, the reinstatement of those who drop out, with a special leaning towards the relief of such crippling disabilities as those of rheumatism. Of this larger view physiotherapy, as heretofore understood, is an essential part, but only a part. The ever-growing call on man-power has led to the development of methods—social, educational, industrial, preventive and corrective—beyond anything regarded before as feasible, and which must survive the stimulus which prompted them, unless medicine has descended to the rôle of time-server. No matter that physical medicine has hitherto eluded exact definition; in this respect it resembles orthopædics. (After enumerating the objects of the association one of the resolutions prudently adds "without excluding matters not herein set forth.") In both cases the latitude promotes the sense of adventure that has always been the spring and the reward of the pioneer, and leaves no ground for the unqualified adventurer to occupy. And the physician cannot complain of the invasion of his territory by outsiders, for it is his own fault if his physic is no longer synonymous with the knowledge of nature.

1. See *Lancet*, 1938, 1, 345.

RELIEF OF COLOUR BLINDNESS

IT comes as something of a shock to read reports from America of improvement in colour blindness after vitamin therapy, for this condition is regarded as a congenital defect which is beyond treatment. Many cases are hereditary, and the legacy has proved a serious handicap to those young people who have thereby been prevented from entering their chosen profession—notably the Royal Navy. The exact mechanism of colour-vision is not understood, but Cadan[1] of Brooklyn has argued that since ordinary vision is associated with a photochemical substance—rhodopsin—colour vision is probably linked with another. He concluded that this hypothetical substance might, like visual purple, be influenced by deficiency of vitamin A, and therefore treated colour blindness by giving 75,000 IU of vitamin A daily by mouth. He supplemented this with vitamin-B complex to assist nerve-tissue metabolism, iodine to stimulate general metabolism and for its antisclerotic effect, electrical stimulation of the eye, and intensive study of colours and colour patterns. Of 45 men with mild red-green blindness so treated for variable periods, 35 passed colour-vision tests for military service for which they had previously been rejected. The men chosen for treatment could distinguish between the primary colours but not between shades of those colours—they were deficient not so much in colour vision as in colour education—and their improvement seems more likely to have come from re-education than from the vitamin therapy. Cadan admits that his treatment is empirical; but his aim was to get these men into the Services rather than to advance knowledge of colour vision.

CANCER RESEARCH CONTINUES

ON Thursday the Imperial Cancer Research Fund presented its fortieth annual report. This year Dr. W. E. Gye has nothing spectacular to report; he has not even given us one of his illuminating surveys of the infiltration of the cancer position by scientific probing; but he is able to assure us that work is continuing in the various branches of research described in previous reports. Heartening too is the fact that more money has been spent than last year, and that more still was available if needed. It is not generally realised how much patience is needed to observe results. Each experiment of Dr. R. J. Ludford's on mammary cancer in the mouse lasts about two years, and some strains of tumour cells have now been transplanted through innumerable hosts over a period of thirty years or more. But royal colleges take long views and the work of Bashford and Murray, now carried on by Gye without a break, transcends such fortuities as world wars. Research dies only with the death of the questing mind and there is, happily, no sign of that. Dr. B. D. Pullinger has been finding an explanation of Deelman's riddle about the appearance of tumours in scars and healing wounds. It seems the trauma alone does not promote malignancy: it does no more than enhance the action of some specific carcinogen. Mr. H. G. Crabtree has thrown further light on how certain halogen compounds, like bromo-benzene, check the formation of induced tumours. They do so apparently by their affinity for the sulphydryl group, which is then eliminated as a harmless mercapturate. Watch the sulphur metabolism of the body is the lesson of many recent observations.

1. Cadan, H. *Med. Rec.* 1943, 156, 21.

ASSOCIATION OF SURGEONS OF GREAT BRITAIN AND IRELAND.—A meeting of this society is to be held on Thursday, July 22, at the Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2, when there will be discussions on the treatment of burns in the field and in hospital, and on the use and abuse of sulphonamide in war.

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Special Articles

THORACIC SURGERY

A MEETING of the Society of Thoracic Surgeons of Great Britain and Ireland was held in London on April 14 and 15 under the presidency of Mr. TUDOR EDWARDS. The discussions were attended by many officers of the fighting services, both of this country and the Allied Nations, who contributed valuable information on methods and views current here and abroad.

First-aid Treatment of Chest Wounds

Colonel J. HOLST (Norway) said that with early and efficient treatment of a thoracic injury good results could be anticipated; delay in bringing the patient from the front line to an operating unit was probably responsible for the high mortality of chest injuries as a whole. If the patient reached a regimental aid-post alive his chances of survival were good, so long as obvious errors in his respiratory function were remedied there. Open pneumothorax or sucking wounds required closure, tension hæmo- or pneumo-thorax had to be relieved, and so on. Aid-post treatment had to be guided largely by circumstance, but three groups of cases had to be considered:—

1. Those in which expectant treatment may suffice.

2. Those requiring immediate intervention—for closure of sucking chest wounds, for ligature of intercostal or internal mammary arteries, for the relief of tension pneumothorax and for the aspiration of hæmothorax or hæmopericardium.

3. Those in which immediate operation is desirable but not practicable under local conditions.

Sucking wounds with open pneumothorax formed a most important group, but only a proportion of these reached an aid-post. Large doses of morphia (up to 20 mg., or ⅓ grain) were invaluable in relieving pain and anxiety, so letting the patient breathe quietly while being moved. The fear of suppressing the cough reflex unduly by morphia was groundless. Closure of small sucking wounds with a pad and strapping should be undertaken as early as possible, and for cases with large defects in the chest wall Colonel Holst described a rubber plate and ring which could be strapped over the deficiency to make it airtight and could be held in place during the possibly long period of return to base units. The question of inserting a leak valve needle or a small tube in addition should always be considered. An intercostal tube with a water seal drainage would be ideal but might not be available or convenient in transport. Oxygen administered by the BLB or some similar mask was of undoubted value in chest cases, and the other factors in resuscitation, such as transfusion and warmth, must not be forgotten.

Colonel Holst felt that he could not make a definite decision between doing major surgery in a forward post with imperfect equipment and waiting until the patient reached a proper chest centre. On the whole he inclined to the latter course if rapid transport (as by air) was available. However, the real problem for the future was to reduce the mortality between the front line and regimental aid-post. Many more lives could be saved if conservative but effective treatment could be applied at this stage.

In the discussion that followed, Service members with experience in the field gave their views especially on the closure of open or sucking wounds. The relative defects of pad, packs and sutures were pointed out. Packs leave the wound still open when finally removed, and stitches may cut through, as well as giving a false impression (if records go astray) that complete revision of the wound has been done. Excessive interference, by needling, during transport down the line is to be discouraged.

Mr. VERNON THOMPSON referred to the position of the patient during transport, and showed if the patient lies on the injured side the shift of the mediastinum to that side reduces the volume of the injured hemithorax. Lying this way the patient tends to keep the wound closed; his position allows full function of the upper lung and reduces the risk of aspirating blood or secretions into the uninjured lung.

The PRESIDENT said that the injuries needing early treatment must include lacerated wounds, with and without a pneumothorax, and tension pneumothorax. How an open wound should be closed was not so important as the fact that it must be effectively sealed, and circumstances must govern each case.

The General Surgeon and Chest Wounds in Forward Areas

Mr. C. PRICE THOMAS defined the forward area, from the surgical point of view, as any unit that contained an average operating team and equipment. Apart from shock and hæmorrhage, the basic cause of death at this stage was interference with the cardiorespiratory reserve. A patient who survived the first 48 hours and yet ultimately died was more likely to do so from sepsis. The degree of shock encountered was variable; it should be remembered that damage of the chest wall might produce severe shock which might mask respiratory distress. Early transfusion and oxygen therapy were essential, and even if there was little evidence of shock the patient should always be kept quiet. If radiography was available it should be used, provided the patient could be moved carefully. At operation it was important not to put fingers or instruments into the wound, but to excise first skin and then muscle and then inspect the opening into the chest. The amount of rib damage should be visualised, and a clean resection performed beyond the area of damage. Blood and obvious foreign bodies could be removed from the pleural cavity before suturing muscle and skin over the opening in the chest wall. Temporary pleural drainage with a closed water seal should be used for 48 to 72 hours. An exception to the complete revision as described might be made in cases with large defects of the chest wall, when suture of muscle that was lacerated might be required to close the opening. Continual watch must be kept for tension phenomena, and when these were recognised a needle must be passed in through the front of the upper part of the chest.

The treatment of the stoved-in chest in which a piece of the chest wall was practically floating in the soft tissue constituted a definite problem in fixation. Strapping was not really effective and cardboard painted over with plaster-of-paris and gauze in layers might afford better support. A window cut in this splint allowed access to the chest for aspiration. Additional complications of chest injuries might result from the patient's inability to cough, owing to the severe pain caused by coughing. The passage of an intratracheal tube with suction of secretions might be valuable. Acute dilatation of the stomach was a possibility to be considered. In aspirating a hæmothorax Mr. Price Thomas held that although air replacement makes the procedure easier this luxury should be dispensed with. If later infection supervened, and particularly if seemingly benign anaerobic organisms were present, repeated aspiration should be persisted with as long as possible before drainage.

In the discusssion Service members gave figures from their experiences in Libya, but it was felt in general that the good results obtained there, and the low incidence of infection, should not be taken as a standard for casualties in future theatres of war. Climate and soil conditions may be to some extent responsible and Brigadier W. ANDERSON emphasised this point in connexion with the severe type of infections seen during the last war.

Mr. J. E. H. ROBERTS said that selection of cases for operation was almost the most difficult part of the work. Senior and experienced surgeons should, in times of rush, do the selection, particularly if available surgical personnel was not adequate to deal efficiently with a sudden influx of casualties. As regards abdomino-thoracic injuries, if the wounds had occurred in the transverse plane the symptoms might be referred to the abdomen; but in operating it was better to go through the chest and repair upper abdominal injuries through the diaphragm. If on the other hand the wound track was oblique then it was probably wiser to open the abdomen first.

Mr. R. C. BROCK spoke of the danger of adopting too conservative an attitude towards all types of chest injury. During the air-raid period in this country the type of chest injury seen was often more severe than that encountered in the field. Major surgery could be very beneficial

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in restoring normal physiology, and Mr. Brock described methods of pulling gaping wounds together or filling them in with rotated muscle flaps.

The PRESIDENT mentioned the possibility of basal lung expansion occluding the usual posterior closed-drainage tube and leaving a pocket of fluid or pus elsewhere. Drainage through a sutured wound was to be deprecated. When abdomino-thoracic injuries were suspected, the surface of the diaphragm should be inspected through the excised chest wound. Also whereas rightsided diaphragmatic injuries had the reputation of being harmless, an adjoining wound of liver might lead to persistent bleeding as the chest movements pumped blood from the liver into the pleura.

Among other points made in the discussion the danger of injury to cartilage was mentioned: damaged cartilage requires early excision. Subcutaneous emphysema can be alarming but usually depends on persistence of a tension pneumothorax; relief of this results in subsidence of the emphysema. Finally it should be remembered that many simple wounds can be more or less left alone, surgical intervention being intended primarily to save life.

Early and Late Treatment of Retained Foreign Bodies

Mr. ROBERTS pointed out that foreign bodies were not always metallic, and that in the last war clothing was a more important source of infection than metal. As regards the immediate treatment of foreign bodies all fragments encountered during wound revision should be carefully removed, though clearly the surgeon inexperienced in chest work would be ill-advised to make prolonged search for a suspected foreign body within the thorax. Small clean punctured wounds with a retained missile could be left alone for the time being. After the initial stages the question of removal of a retained missile would depend on a variety of circumstances. Broadly speaking anything over 0·75 cm. in diameter, and bullets, should be taken out, also fragments lying against the pericardium or in the mediastinum.

When a long period had elapsed from the time of injury treatment depended on symptoms. The symptomless case could be left alone, but if there was hæmoptysis, pain or sputum the case required careful investigation. The coexistence of a lung abscess or bronchiectasis had to be checked and treatment planned accordingly. The actual operative removal was usually quite simple; exact radiological localisation preceded excision of a short length of rib over the foreign body which was then recognised by insertion of a needle. If the pleural cavity was free the operation might have to be done entirely under the X-ray screen, since it might be impossible to palpate the foreign body through spongy lung tissue. Infective changes in the lung would naturally lead to different methods being adopted.

Mr. HOLMES SELLORS gave the figures for intrapulmonary foreign bodies encountered at Harefield Chest Unit during this war. In a series of 52 cases, the missile was removed at immediate operation in 15 (of whom 4 died as a result of coexistent injuries), it was removed at a later date without incident in 14, and it was left alone in 23. The production of a pericardial effusion and proximity to great vessels was regarded as an indication for removal. A number of extracted foreign bodies had been cultured, and a large proportion had been found sterile.

Mr. RONALD EDWARDS described the closed method of removing foreign bodies which he had practised in a few cases. A long pair of forceps introduced intercostally through a small incision is guided under the fluorescent screen on to the foreign body, using the method of parallax to obtain orientation.

Mr. H. MORRISTON DAVIES felt that the closed method, now revived after an interval of 20-odd years, should be judiciously considered; but in any case, when dealing with retained missiles, operation of any sort should be delayed for 6–8 weeks so that the lung had a chance of settling down.

Other speakers pointed out that a conservative tendency had increased as regards removing foreign bodies. They suggested that closed removal had never really caught on and might even be dangerous if used in cases of long standing.

Treatment of Pleural Empyema

Mr. P. R. ALLISON said that the essential part of the treatment of empyema was drainage, but it must be undertaken only when pus was adequately localised. In resecting a rib the piece removed should be long enough to allow proper inspection of the cavity, which could be cleaned out before inserting a wide tube for drainage. The main principles of drainage should never be forgotten, and attention centred round apparatus should not distract the surgeon from the empyema cavity itself. Bad drainage might be due to obstruction to the tube, or to the tube being outside the pleural cavity, or too far in, or too narrow or kinked; or there might be dependent and undrained pockets, or loculation. Radiological control during healing was important, and many details must be considered until the cavity was nothing more than a narrow track from which the tube could be omitted. Physiotherapy from the earliest stages was an essential part of treatment.

Mr. HOLMES SELLORS pointed out that treatment started from the moment the diagnostic aspirating needle was inserted. If thin pus was obtained at this stage repeated and frequent aspirations were necessary until the pus became thick, indicating that the empyema was localising. In the earlier stages of drainage too frequent changing of the tube often led to trouble, because an adequate wide bore tube was often replaced by progressively smaller tubes.

Mr. MORRISTON DAVIES discussed infected hæmothorax, which he said required very careful watching because infection might light up very easily and suddenly. An increase of serum as a result of pleuritis might lead to a rise of temperature.

Mr. N. R. BARRETT considered the special difficulties of war-time empyema. Anaerobic infections were not always due to the *Cl. welchii* group, and there was a tendency for these collections to loculate. Many empyemata were total, as a possible sequel to atelectasis or lung hæmatoma, and in these the base often expanded more quickly than the apex. However, they would usually close in the end even if the lung took over a year to expand, as it did in one case.

Mr. PRICE THOMAS gave a warning against indiscriminate use of needles before an empyema was clinically diagnosed. Pleural infections had often been produced by injuring underlying infected lung. He also recalled the dangers of draining an empyema too early.

Mr. ROBERTS stressed the dangers and disability of chronic empyema. Current teaching in textbooks was often responsible for too early removal of tubes, which itself was a potent source of future trouble. As long as there was a cavity in the chest there was need for a tube. He felt that the first thing to do with a chronic case was to re-drain, to remove a piece of pleura for biopsy, and to start breathing exercises from the beginning again. Well over half the cases healed without much trouble, but when re-expansion had reached its limit something further had to be done. Small cavities could be closed with pedicle muscle grafts. With larger spaces the pleural-flap operation designed by the speaker could be used. This involved removal of ribs and cutting the thick parietal pleural roof free on three sides. The fourth side acted as a hinge from which the flap was pressed down into the bed of the cavity, where it was held in place with a pack. As the patient was often very debilitated the procedure might have to be undertaken as "one operation in several stages."

The question of protein-loss and œdema in empyema was discussed particularly by Mr. RONALD EDWARDS and Captain DUMONT. The blood-protein figures are often low as might be expected from the prolonged drain of pus. Serum albumin may fall unduly, and as this is an essential osmotic agent its reduction may be responsible for œdema. Small and repeated transfusions should to some extent balance the anæmia, and with a high-protein diet the low blood-protein figures will be restored.

Infectious disease figures for the Reich in the week ended Feb. 20, the latest available, were as follows. Diphtheria 4915 cases, 244 deaths; respiratory tuberculosis 2628 cases, 75 deaths; tuberculosis of other organs 318 cases, 100 deaths; typhoid 347 cases, 24 deaths; paratyphoid 73 cases, 0 deaths; dysentery 67 cases, 4 deaths.

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In England Now

A Running Commentary by Peripatetic Correspondents

Dawson's speech in the Lords on the medical aspects of the Beveridge proposals (*Lancet*, March 6, p. 319) made good reading. We all want to bring preventive and curative medicine together, but we shall have to be watchful about the care of the patient. Medicine is getting more and more into the hands of the honours physiology schools and the hygienists. We can control epidemics and use specific therapy vastly better than when I entered the profession, but our symptomatic treatment of the diseases which have no specific remedy is much worse. I do not want to see the patient overwhelmed with science; medicine is still an art. Dawson himself quoted, "There are no diseases, there are only sick people."

Self-determination will be much more difficult for us to attain than for the Bar or the Church. The Bar can fall back on nearly a thousand years of authority, and the Church on conscience. I can see High Anglicans and Catholics, Free Churchmen and Quakers going to prison for their religious views, but somehow I cannot see doctors going there for the sake of their scientific views or their professional organisation. I have an uneasy feeling that we are going to fail in this demand for self-determination. The one thing that would save us would be a very high standard of intellect and character. If we could convince the general public that we really were big men they might accept self-determination, but I fear they will not accept that nowadays. We have lost, thank goodness, the old authoritarian position but have put nothing in its place. We are laughed at good temperedly for the twaddle we talk at annual meetings or scolded for our commercial proclivities, but we are not taken seriously as outstanding citizens who dominate by our intellect and can be trusted to run our own show in such a vital matter as the nation's health.

Another point which I feel needs emphasis is size of scheme—preventive or curative. On all sides now one hears of demands for grouping and regrouping, coöperation and coördination, always into larger and larger units. Is there not a danger that we shall thereby lose a great deal of "*geist*"? If we are to retain individuality in medicine, and if on the social side we are to retain it in citizenship, I hope the units will not be too large. We all know the pushful man who forces his way to the top in the large scheme, who knows what he wants and cares little how he gets it. We also know the value of the thoughtful introvert who can only adequately express himself in the small group, and is inarticulate in the large. For this reason I am all in favour of the voluntary hospitals remaining small. Their raison-d'être is their personality and individuality. In all this I find myself moving towards one conclusion in the reconstruction of our profession—a far greater emphasis on character in our training in the medical schools. There will have to be some selection of entrants to get the right type of recruit, and I should like to see this done on the lines of the Rhodes Trust, with full consideration given to character and capacity to lead, on all the factors of a good school record and a broad background. I am terrified of the bright youth who can answer examination questions in his sleep but is a sheer nonentity with his fellow students. In the old go-as-you-please days it did not matter much—he could be left declaiming at the street corners or in the hospital common-room—but it is going to be very different when we have thrust on us the responsibilities of Beveridge reports and national health, when we are all pensionable civil servants, and when the incentive to strive is no longer the necessity of making a living but the demands of good and faithful citizenship. Fortunately, these good and faithful servants of the state are not all in one camp; there are as many on the right as the left, in the voluntary as in the state organisations. I think they will be able to work together.

* * *

When I listen to arguments at meal-times I am struck by the fact that most people have their beliefs and ideas grouped into indivisible constellations. Type A, for example, approves of cricket, God, corporal punishment, and Gilbert and Sullivan; whereas type B praises the Beveridge report, a second front, the ballet, and Karl Marx. Type A dislikes Jews, chamber-music, state medicine, long-haired men, and the *New Statesman and Nation*; type B abominates voluntary hospitals, jazz music, public schools, and changing for dinner. Personally I enjoy both chamber-music and jazz; I cannot understand Marx, and I dislike the ballet; I am agnostic, but dislike long-haired men, and though I enjoy the *New Statesman* and approve of the Beveridge report, I like to change for dinner although I believe in a state medical service.

Anyone not subscribing entirely to the orthodox dogma of type A or B has a hard lot. He is a double-dissenter, prone to be labelled both "red" and "reactionary," and accused of running with the hare and hunting with the hounds. Yet what can I do? Must I either accept all the tenets of orthodox religion, or learn to understand Karl Marx? It can't be done. Does an admiration for Gilbert and Sullivan imply that I must take an interest in cricket? I hope not. All this clotted thinking is an abomination. Can the average citizen only digest ideas in certain set mixtures? Must our beliefs be chosen from a few huge made-up dishes without any allowance for à-la-carte? This is the system of party politics, the polemic equivalent of the "all-or-none law." I hope that medicine will never be invaded by this thought-agglutination, or rational thinking will be at an end, and those who believe that human erythropoiesis is extravascular will perforce be enjoined to defend the placental theory of pregnancy toxæmia and advocate the surgical treatment of all hæmatemeses.

* * *

In the course of my work for the coroner I travel over a good many miles of country, and the other day I was sent to an early Victorian workhouse, standing in the open fields miles from anywhere. The board-room with its polished table and severely utilitarian appointments is reminiscent of other days. The mortuary, however, is more modern. It consists of two compartments, one containing metal racks, and the other, used as a post-mortem room or a viewing chamber as required, opens by a french window on to a garden, and is provided with a small oak prie-dieu. On this I noticed a venerable looking volume bound in ancient calf, which the mortuary keeper told me he had found in the library and had brought down as he thought it would look well. It was a copy of John Wesley's *Hymns for the use of the people called Methodists*, dated 1797. Turning over the pages I found a funeral hymn, the first verse of which expressed sentiments I thought particularly appropriate to the coroner's pathologist:

> "Ah! Lovely appearance of Death
> What sight upon Earth is so fair,
> Not all the Gay Pageants that breathe
> Can with a dead body compare.
> With Solemn delight I survey
> The Corpse, when the Spirit is fled,
> In love with the beautiful clay
> And longing to lie in its stead."

And since John Wesley in his preface states that in these hymns there is no doggerel, no feeble expletives, no botches, nothing turgid or bombast, no cant expressions or words without meaning, and that they show in the purity, strength and elegance of the English language the true spirit of poetry which must be the gift of Nature, I suppose I am right in assuming that these sentiments are true.

* * *

The naval hospital of the maritime American community in which I am staying is a fine new building in the Spanish style and mostly single-storied. It is kept spotlessly clean with various complicated machines that suck and blow and brush and spin round in circles. The food is excellent when you have allowed for the national sport of taking all the nourishment out of wheat, giving it a shot of artificial chemicals and vitamins and serving it up as bread or cereal. The galley would be a credit to J. Lyons and I think even he would have something to learn about cold storage and deep freezing. Their X-ray apparatus is very modern and produces the best pictures I, in my small experience, have ever seen. The orthopædic table is so complicated that even the mechanically-minded orthopods cannot put it together.

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Twice a week I go down to the hospital in town—an old-fashioned building with medical school attached, where there is no air-conditioning to remove the ammoniacal smell from the urogenital ward, and where chromium plate has not entirely displaced the yellowing white enamel. In such an atmosphere I think most British doctors would feel at home. The hospital treats coloured and whites in about equal proportions and the two are kept separate in wards and clinics. I attend the children's clinic mostly, where the patients are about 90% coloured. This is the home of the "zoot (suit) with the repe (pleat)" and peg trousers are all the mode. The babies wear shark-bone necklaces to help them cut their teeth and the mothers sprinkle salt on their hair to cure worms. The coloured babies make excellent patients. They all have protuberant navels containing easily reducible herniæ, and divarication of the recti is almost normal. The common diseases in the clinic are the usual respiratory infections with a good sprinkling of pneumonias, rickets, infectious diarrhœa, sickle-cell anæmia, congenital syphilis, acute encephalitis and poliomyelitis. I have seen three cases of tetanus, one of typhus, and one of syphilitic hæmoglobinuria brought on by cold. The Sister Kenny treatment is popular and thought to be an advance, though it is a mystery to me why the patients do not all get rheumatism. Congenital syphilis is treated with arsenic by mouth in the form of acetarsol, starting at gr. 1/30 per lb. body-weight daily for the first week and working up in four weeks to gr. 1/7 per lb. daily, which is given for 18 months. Bismuth sodium tartrate is given concurrently.

I can only hope that American service doctors in England are made to feel as welcome and are shown as much work as has been my fortune over here.

* * *

Lord Leathers who insists on asking: "Is your journey really necessary?" might find food for thought in the addresses of private patients in the London hospitals. Two main causes have tended lately to increase their number—the closing of nursing-homes and the difficulties of travelling for the medical staff. But primarily, as in peace-time, it is the lure of London which accounts for this demand combined with the loyalty of medical students to their hospital and their former teachers. The latter reason may have particular force now, when the younger man believes that his senior is more in need of the fees, even if they are a bit reduced to meet war conditions. Nevertheless, unless the family doctor adopts some kind of regionalisation in the distribution of his private patients it may be necessary for Lord Leathers to zone them like fish and sweets.

* * *

In his *Inquiries into the Human Faculty* Galton published some fascinating work with superimposed photographs. By producing a composite picture from the portraits of sundry criminals he hoped to record the average face of a wrong-doer. Certainly the effect of seeing these desperadoes literally cheek by jowl is impressive; the union of their assorted beards, moustaches and jaws into one hairy blur gives a particularly villainous appearance to the result. There is undoubtedly a typical facies for professions other than criminal, and perhaps even for the subdivisions of our own. Do physicians, surgeons and otorhinologists each have characteristic features? Certainly most of us have a mental picture of the average types, based probably on the chiefs at our teaching hospitals.

I think of a typical physician as having a rather sad yet distinguished face, sober and scholarly. He would have a predilection for well-cut grey suits. Surgeons are handsome; more boisterous than the physicians, their features are less composed, reflecting either elation or irritability. They move about restlessly in black coats and striped trousers, or pace along theatre corridors in vests and rubber aprons looking annoyed. Ear, nose and throat men are big jolly fellows, rubicund and emphysematous, with hair sprouting from the back of their hands. They have expensive cars and laugh rather loudly. Gynæcologists are very smooth indeed. Because they have to listen so often to woeful and sordid symptoms they develop an expression of refinement and sympathy. But there is no hard and fast rule, and even a crude hairy buffoon may become a physician if he practises expressions in front of his looking-glass.

Letters to the Editor

RENAL UNITS

SIR,—Impending decisions on the reorganisation of the medical services demand that attention be drawn to the need for more adequate facilities for the treatment of patients suffering from Bright's disease. The term is used here in its usual sense to include not only all forms of nephritis, nephrosis, nephrosclerosis and the chronic myocardial sequelæ of renal disease but also the renal complications of other conditions such as pregnancy and diabetes as well as amyloid disease of the kidneys, renal dwarfism and so forth. Recent work on renin suggests that most instances of essential hypertension should also be included. Bright's disease, thus defined, is, after heart disease, the most common cause of death in this country, and its morbidity is much greater than the recorded mortality. Its investigation and treatment, therefore, is one of the most important medical problems of the day. Yet, apart from a small, though notable band of more or less independent research workers, and one or two clinics run by individuals with a special interest in the subject, there is practically no special provision for tackling on an adequate scale a disease which causes more deaths than either cancer or tuberculosis. Perhaps the most important reason for this neglect is that the lack of any direct or specific remedy has surrounded the whole subject with an atmosphere of gloom and defeatism. Bright's disease is still regarded by most in much the same light as was pulmonary tuberculosis fifty years ago—as a more or less hopeless condition. In the interval between the last and the present war, however, knowledge of the prognosis in Bright's disease has increased enormously; the now considerable literature shows that in some forms of the disease the outlook is often not unfavourable, and some writers of experience (with whom I agree) stress the value of early and thorough treatment. At present this more optimistic note is only sounded in respect of certain types of Bright's disease; but it is surely significant.

Broadly speaking, treatment in Bright's disease consists of the application of two essential measures—rest and diet. Some (including myself) would add a third—drug therapy. The question is whether these measures are being used so as to secure the best results. After specialising for some twenty years in this branch of medicine I have no hesitation in stating that usually they are not. Too often it is considered sufficient for the patient to linger in bed either at home or in the wards of an hospital, amidst a miscellany of diseases requiring other methods of treatment, while various remedies are tried in turn in a more or less haphazard and perfunctory manner, often by those with little interest in, or experience of, the special needs of those suffering from Bright's disease. Alternatively, after a few weeks in bed, patients are sent home to get along as best they may, in the belief that nothing further can be done.

Much more than this is required. The degree and duration of rest, the necessary modifications in the diet, assessment of the fluid balance, and the prescription of drugs, cannot be satisfactorily regulated by the appearance or subjective sensations of the patient, rather crude measurements of fluid intake, output and body-weight, supplemented at infrequent and irregular intervals by estimations of blood-pressure and blood-urea, and occasional qualitative examinations of the urinary sediment. To get the best results from the available measures the patient must be under continuous expert supervision, not only while in hospital but after his discharge, and throughout the course of the disease all relevant data must be obtained at frequent, and above all at regular, intervals. Further, such data must be systematically graphed *as part of the treatment*. It is mainly from a study of graphs that minor fluctuations in the course of the disease are revealed in time to effect necessary readjustments in treatment.

A patient undergoing treatment for Bright's disease is a member of a team working for a common object—the cure or amelioration of his disease. The other members of the team are the hospital physician, sisters and nurses, the general practitioner, and the staffs of the hospital laboratory and outpatient clinic. His chances of recovery, or at least of securing the maximum relief, will

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surely be enhanced if these other members of the team are specially trained and skilled in their work, and can give the whole of their time to it. Nothing has impressed me more in treating these patients than the importance of apparently insignificant details, and no-one but the specialist has the time to give these due consideration.

I believe that the urgent need for higher standards of efficiency in the investigation, nursing, treatment and aftercare of patients suffering from the medical diseases of the kidneys can only be met by the establishment throughout the country of a sufficient number of Renal Units staffed by specialist doctors and nurses. A beginning has already been made on these lines, for it has been decided to create such a renal unit at the County Hospital, Pembury. If the medical services are to be organised on a regional basis, it is to be hoped that at least one similar unit will be provided in each region.

Pembury, Kent. A. OSMAN.

JAUNDICE IN SYPHILITICS UNDER TREATMENT

SIR,—I was much interested in Lieut.-Colonel Bigger's ingenious theory that jaundice in syphilitics under treatment may arise from the transfer of a virus from patient to patient, and this may well be a factor. The clinic whose figures form the basis of these comments comes, I am afraid, into his category of "much more perfunctory" and as such may interest him as a control. The incidence of jaundice—9·3% in 1941 and 20·4% in 1942—seem at first sight to strengthen his argument, but the big rise in 1942 which he also experienced may in part be due to the large amount of catarrhal jaundice about in the latter part of the year. On the other hand, I would like him to consider, first, that jaundice usually appears early in the treatment (68·7% of our cases occurred towards the end of the first course or at the beginning of the second); secondly, that 80·5% occurred during treatment with 'Stabilarsan' (this is probably quite fortuitous and due to our habit of giving stabilarsan for the second course); and thirdly, the fact that although our technique has not altered the incidence of jaundice has almost doubled.

Harley Street, W.1. KEITH DUFF.

BREAST ABSCESS AND THE STAPHYLOCOCCAL NURSERY

SIR,—I was somewhat surprised that Macpherson, in his paper cited in your leading article of March 13, had taken so little account of the bacteriological aspect of breast abscess, or of the relationship between puerperal mastitis and other manifestations of staphylococcal infection, such as pemphigus, conjunctivitis, paronychia, neonatal folliculitis and impetigo, which are so commonly associated with it. I made a report on the subject which was quoted in the *Lancet* of July 11, 1936, and subsequently was referred to in Appendix A of Sir Arthur MacNalty's Annual Report to the Ministry of Health for 1938. I concluded then that the infection of the mother came from the baby and I see from your issue of April 10, 1943 (p. 462), in the account of the proceedings of the Association of Clinical Pathologists, that Dr. Knott has also come to the conclusion that the babies infect the mothers' breasts during suckling, and that exclusion from the wards of all mothers, children and nurses yielding grade A staphylococcus effectively controlled the outbreaks.

This opinion was confirmed in the June, 1942, issue of the *Bulletin* of the EPHLS, wherein the statement appeared that "the prevention of outbreaks of staphylococcal infection in maternity homes demands a constant watch for suspicious lesions in infants, mothers and staff and a prompt isolation of suspicious cases pending bacteriological and clinical diagnosis." It was further recommended that "strains should be typed before insisting that carriers should be taken off duty." Nevertheless when the attention of the Ministry of Health was drawn to the virtual impossibility of giving effect to these counsels, the advice given was that "serological identification of types of staphylococci is not at present possible in the routine investigation of all outbreaks of staphylococcal infection. Laboratory facilities are not generally available for the typing of staphylococci as very few people in this country have had experience in their identification." Unfortunately there was no correlation in the *Bulletin* of puerperal mastitis and other staphylococcal infections. It was indicated that although two of the few mentioned were applying staphylococcal typing to epidemiological inquiries, neither was in a position to investigate any and every outbreak, and that knowledge of the serological typing was still in the elementary stage and there was some doubt regarding the value and interpretation of the findings.

Since 1935 I have investigated a considerable number of institutional and district cases, reviewing all possibilities of the source, nature and mechanism of infection, the antenatal and postnatal, local and general conditions of patients and their environment. The crux of the problem appears to be the typing of *Staphylococcus aureus hæmolyticus* (the organism invariably responsible) which so far it has been impossible to arrange, and without which no accurate advance in our knowledge of the subject is possible.

I do not agree that poverty, poor health, breast engorgement and incomplete emptying have by themselves been determining factors in puerperal mastitis, whatever their contributory influence. They are all extremely common in normal cases and do not obtain in many cases of abscess. My experience has been that the graphic curve of district cases closely parallels that of those in institutions, and while an obvious abscess often begins after the 14th day, it is almost the rule for some nipple trouble or "breast flush" to occur and subside betweeen the 8th and 12th days of the puerperium. Therefore I cannot agree that the condition has its beginnings when "the mother and child have been discharged from the lying-in wards" nor do I consider that it is due to forgetfulness of "details of hygiene and prophylaxis laboriously instilled by the hospital staff." The circumstance finally determining the onset of mastitis is undoubtedly the presence of the appropriate strain of *Staph. aureus*, and this is abundantly confirmed by the outbreaks of epidemic proportion which have of recent years affected many large lying-in-hospitals. I hardly think therefore that your leading article of Sept. 26 on the staphylococcal nursery, or the one on breast abscess, represents our knowledge on the subject. If all outbreaks could be investigated in the way which it appears Dr. Knott has been able to do, our knowledge of the subject could be still further extended.

Ilford. A. H. G. BURTON.

INSTRUMENTS OF SOCIAL MEDICINE

SIR,—Without detracting from anything that is written in your leader of April 17, I should like to enter a plea for an equal recognition of the importance in the future of the almoner's younger sister, the psychiatric social worker. In all fields of psychological disorder the trained psychiatric social worker has a contribution to make at least equal to that of the almoner in her field, and she has the advantage in almost all instances of being free from the burden of levying taxes. Incidentally, you would confer a real benefit if you could discover a good English word—old or new—to replace her present cumbersome designation.

Southall, Middlesex. J. B. S. LEWIS.

RESPONSIBILITY IN HOSPITALS

SIR,—I appreciate your efforts to improve the status and salary of clinicians in the municipal hospitals; but I, among others, take exception to your statement that "medical life and practice in the average municipal hospital present a sorry picture" (April 3, p. 433). For a number of years competition for entry to these posts has been increasingly keen and the standard of entrants was high. That their performance was good can be deduced from their many contributions to your own columns. Further, they earned the praise (in the municipal hospitals anyway) of senior consultants from teaching schools, and the gratitude of those medical students who have seen the wealth of well-documented clinical material in these hospitals. But the crucial test is the increasing use of the services of municipal hospital clinicians by patients and practitioners. More patients from wider and wider groups of the population now deliberately seek their help, which suggests that the doctor-patient relationship at the municipal hospital is

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not unsatisfactory. (I fully acknowledge that the service the clinicians give depends on the combined efforts of all grades of hospital staff and on the public spirit of the lay committees). An indifferent doctor may occasionally occupy a niche in a municipal hospital, but promising clinicians have been known to deteriorate even in exalted positions in great teaching hospitals. Most doctors, however, do good work in both municipal and voluntary hospitals. Your picture of jaded municipal medical mediocrities is obsolete.

St. Andrew's (LCC) Hospital, E.3. ELI DAVIS.

SIR,—I think the issues are really wider than the clinical differences of the so-called hierarchy and parallel systems of organisation. Both voluntary and municipal hospitals are working for the common good along different roads. In the voluntary hospitals the member of the visiting staff whose name appears on the treatment chart is ultimately answerable to the governing body for any accidents, mistakes or complaints which may arise. The medical committees of these hospitals, consisting of the visiting staff and the heads of the special departments, are responsible for the broad general principles of medical policy, for recommending the purchase of very expensive apparatus (such as X-ray plant) and the opening of new special departments, and for the supervision of new and sometimes revolutionary treatment. For instance, in the past, there have been serious discussions on the use of tuberculin, which caused numerous deaths before we learnt the dosage, on the original "606" which raised not a few problems, on radium and the expensive gold salts, and on the rarer and more costly antisera. Then there are secret remedies and patent appliances, which are not all at once to be discarded as contemptible; on medical committees rests the responsibility of refusing or permitting a test, and, if the latter is agreed upon, of determining the conditions under which the test should be made. Today these committees are regularly considering and advising on the conservation of drugs which are in short supply and on other clinical matters of wartime urgency. Am I right in assuming that in the municipal hospitals many of these responsibilities fall upon the broad shoulders of the medical superintendent whose onerous duties increase as the hospital system develops? There are differences between one voluntary hospital and another, as there are between one municipal hospital and another—differences both of kind and degree—but broadly speaking it may be said that the voluntary hospital is a self-contained unit with the responsibility for all medical matters vested in its medical committee on which the special departments are also represented; the municipal hospital is part of a larger unit, the local authority, and its medical responsibility rests either directly upon the superintendent or indirectly through him on the headquarters staff. May I suggest that in the postwar scheme of things there will be a right and proper place for both types of institution? Habits of thought and endowments, geographical situation and industrial development, are among the factors which will determine the choice.

Victoria Park, E2. S. ROODHOUSE GLOYNE.

THE RED CROSS

SIR,—In your annotation of April 17, summarising Dr. Cawadias's paper given at the Royal Society of Medicine, you emphasise that the principles set out in the Geneva Convention are essentially utilitarian and not humanitarian. It would perhaps have been relevant to point out in your note that the traditional privileges of doctors are just as little its concern. I believe that a misconception exists in the profession as a whole that certain rights are secured to its members under the convention by virtue of their professional status; these rights include repatriation and freedom from treatment as a prisoner of war. They do not realise that their position is entirely secondary to, and dependent upon, the provisions made for the sick and wounded, who are the sole concern of the original convention. A large number of the profession are now serving with the Forces and it may be timely to dispel any illusions that they enjoy certain professional consideration, and to state the position about doctors serving in the Forces during this war.

As far as it has been possible to find out from the published lists, some 400 doctors from this country and the Dominions have been taken prisoners of war; I have no evidence that any have been returned to their own country. Moreover, the position of doctors serving with the Navy and the Air Force, compared with those serving with the Army, is obscure.

AMULREE.

ACCIDENT SERVICES

SIR,—The war, with its increased damage to civilians, has greatly enhanced the importance of an adequate service in every hospital to care for accidents, not merely for fractures, as your leading article of April 24 emphasises. In American hospitals the accident ward or emergency service has long been an integral part of the hospital's function, but it has not always obtained an adequate share of the high professional service which the complexity and severity of trauma demand. In many hospitals the work in the accident ward was previously left to juniors, whereas all experienced surgeons know that the surgery of a badly damaged and infected right hand is a much more difficult problem than the removal of a gall-bladder or other intra-abdominal procedures often reserved for the expert surgeon. Moreover, trauma suddenly vitiates the earning capacity of the head of a family, and therefore involves the question of state assistance.

The emergency service must be a 24-hour one; indeed in many places accidents occur mostly at night. The service should be accessible to the X-ray department, and have adequate facilities for the treatment of shock, including the giving of blood. It should be properly staffed with senior personnel, full-time junior personnel, orderlies and nurses, and it is best for the peace and cleanliness of the hospital if beds are specially set aside for it, so that noisy and dirty accident cases are not suddenly thrown into the quiet of the ordinary hospital ward. The service must be equipped for all forms of trauma. Fractures may constitute a large fragment or even a major share of the admissions, but fracture of the skull is almost as frequent in some accidents as fracture of the extremities, and even exceeds peripheral damage in risk to life. Again, intrathoracic and intra-abdominal damage may occur without a break in the external parietes, and this requires great skill in diagnosis as well as expert surgery.

As communications speed up and industry becomes increasingly mechanised, we can hardly hope to escape an increasing number of cases of trauma entering our hospitals. To be ill-equipped to handle this great part of medical practice will be to lose the trust of the people in our medical institutions, and it behoves all doctors to bring this important subject to the notice of the governing boards and authorities of their hospitals, whatever their type.

ELLIOTT C. CUTLER.

Infectious Disease in England and Wales

WEEK ENDED APRIL 17

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2058; whooping-cough, 1944; diphtheria, 723; paratyphoid, 3; typhoid, 11; measles (excluding rubella), 16,732; pneumonia (primary or influenzal), 1139; puerperal pyrexia, 159; cerebrospinal fever, 103; poliomyelitis, 5; polio-encephalitis, 1; encephalitis lethargica, 2; dysentery, 107; ophthalmia neonatorum, 91. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on April 14 was 2378, including scarlet fever, 626; diphtheria, 214; measles, 739; whooping-cough, 297; enteritis, 103; chickenpox, 62; erysipelas, 4; mumps, 18; poliomyelitis, 1; dysentery, 26; cerebrospinal fever, 15; puerperal sepsis, 20; enteric fevers, 5; german measles, 44.

Deaths.—In 126 great towns there were 2 (0) deaths from enteric fevers, 2 (1) from scarlet fever, 12 (1) from measles, 13 (2) from whooping-cough, 16 (2) from diphtheria, 49 (5) from diarrhœa and enteritis under two years, and 43 (1) from influenza. The figures in parentheses are those for London itself.

Manchester reported 7 deaths from diarrhœa and Birmingham 5.

The number of stillbirths notified during the week was 236 (corresponding to a rate of 35 per thousand total births), including 27 in London.

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Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE House has adjourned for a short Easter recess after passing the Catering Bill, the Nurses Bill, various other bills and the Budget Resolutions. On the basis of these resolutions the Finance Bill will be introduced after Easter, and a further opportunity for debate offered. But on the presentation of the budget, and on the budget resolutions there has been an almost astonishing lack of debate. Pounds, shillings and pence are regarded as important symbols but the House is more concerned with the concrete facts of war, with the organisation of our resources of men and material for waging the war and preparing for the peace.

The last debate of all, before the adjournment, was a brisk little affair concerning the examination of soldiers by women medical officers. Mr. Bellenger alleged that the matter had been mishandled in a case he quoted and a man ordered by a male medical officer to strip completely for a routine FFI examination by a woman doctor. The Financial Secretary to the War Office announced that in future such examinations would be called "health" inspections, and that in future a man, or woman, will have the right to be examined by a medical officer of their own sex. The background to this discussion is the shortage of doctors. But no one suggested that in view of this shortage examination for vermin infestation or other skin affections and for venereal disease might be carried out by an NCO trained for the purpose. To change a parade for FFI inspections to health inspections in a clinic-like atmosphere will not touch the crucial point of shortage of medical personnel.

When the House resumes there is to be a debate on housing and on the Hydro-Electric Development (Scotland) Bill. Sir Walter Womersley announced that pensions appeal tribunals are to be introduced and that they are to begin work in July. This means early legislation. The legislation will follow that passed in 1919 under which the last war's pensions appeal tribunal still continues to function, and it is unlikely that there will be any great change in the constitution of the boards. The new PAT, like the old, will have a lawyer as chairman, and as the two other members a doctor, who will be a generalist and not a specialist, and a Service representative, officer or other rank according to the rank of the appellant. But one change is imposed by the nature of this war. The PAT will have to deal with civil defence workers as well as with the Armed Forces, and with Merchant Marines as well as with the Royal Navy, and when the appellant is not a member of a fighting service, the Service representative on the tribunal will be drawn from the appropriate civilian Service. There are also a large number of women in the Auxiliary Forces and it has not yet been decided whether women doctors will serve on the tribunals or be called in when required. The last war tribunals worked well and their constitution of three members of equal status, each with expert knowledge and each with equal share of legal responsibility, proved a balanced organisation whose duties were carried out smoothly and without friction. The function of the PAT, which is appointed by the Lord Chancellor and is a court of the House of Lords, is quite different from that of lawyers or doctors concerned in Workmen's Compensation cases. The medical appointments will be whole time, and the tribunal will be as completely independent as any other court of appeal.

A matter looming a little further in the distance is the form of comprehensive and unified medical service to be introduced by the Government. The medical profession is at a political disadvantage as compared with the Ministry of Health, but fortunately we are a democracy, and many arguments will be heard and considered before a bill is presented to Parliament. And in Parliament there will be ample occasion for further debate. But the profession will have to decide whether they are to become civil servants, whether of the Ministry, or of a region, or of local-government authorities. Is the position of medical practitioners under a comprehensive service to debar them from public work as members of local-government representative bodies or of Parliament? It is worth thinking about.

FROM THE PRESS GALLERY

Lord Horder's Amendment

At the second reading of the Nurses Bill in the House of Lords, Lord HORDER announced he would put forward a new clause, and when the bill reached the committee stage on April 20 he accordingly moved:

"Any person who, knowing that some other person is not registered or enrolled, makes any statement or does any act calculated to suggest that that other person is registered or enrolled shall be liable on summary conviction to a fine not exceeding, in the case of a first offence, ten pounds, and, in the case of a second or any subsequent offence, fifty pounds."

Lord Horder recalled that the Nurses Reconstruction Committee over which he had presided had taken the view that it was in the interests of the public, and in the interests of the nursing profession, that it should be a closed profession. The Minister of Health, however, was not able to go that length. The purpose of this new clause was to save the public from exploitation by so-called nurses who were neither in possession of the State Register certificate nor enrolled as assistant nurses. Under the bill as drafted it was not an offence for a third person, not the nurse herself or an agency, to represent a woman falsely as having such qualifications. Lord SNELL in accepting the new clause said that the sort of case in which it might be difficult to prove an offence would be one in which the management of a less reputable nursing home dressed up unqualified girls to look like qualified nurses and represented them as such.

Inspections by Women Doctors

In the House of Commons, on April 20, Mr. F. J. BELLENGER, following up a series of questions which he has addressed to the ministers in charge of the three Service departments, raised again the question of routine medical examination of men serving in the Army by women medical officers. He quoted extracts from a letter written by a non-commissioned officer who alleged that he had been paraded for inspection by a young woman medical officer of about 24 years of age. When he asked to be examined by a male medical officer the latter refused and threatened to put him on a charge if he did not submit to the FFI inspection by the woman medical officer in spite of the fact that the male officer was present and also a corporal of the RAMC who was quite capable of carrying out the inspection. Mr. Bellenger disclaimed any desire to dispense with women medical officers, but in these routine examinations he thought that regard should be had to the susceptibilities of men in the Services and their dislike of being examined by women. Mr. Bellenger admitted he would not himself obey an order to undergo such an examination, even if it were given by a superior officer. He did not think that it was desirable to make a parade of these medical inspections. When coming back from leave, or even on other occasions, men might be suffering from venereal disease. It was carrying things too far from the hygienic and health point of view to make a man own up in front of his comrades. We now had a civilian Army of men of all shades of opinion and some attention ought to be paid to their points of view.

Sir ARCHIBALD SOUTHBY and Mr. G. C. HUTCHINSON supported Mr. Bellenger and stressed the distinction between medical inspections of an exceedingly private nature and treatment in hospital or in an emergency. Mr. R. H. TURTON and Sir WILLIAM WAYLAND were against any pledge which might entail a shortage of doctors on the fighting fronts. Mr. J. J. DAVIDSON, speaking from experience of the Army and army hospitals, objected to women doctors carrying out the thorough examination necessary to grade men in their proper categories. Mr. T. E. DRIBERG dismissed the distinction drawn between routine inspection and treatment in hospital. They must keep, he said, some sense of proportion. Surely the first consideration was that diseases, and in particular venereal disease, should be prevented and cured; and the second consideration was the acute shortage of medical man-power. Medical man-power, whether male or female, must be used in the most economical way possible. When women were accepted in a profession they must be treated as equal professional

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partners. Earl WINTERTON warned the House that at a time when there was considerable talk of a state medical service it was most inappropriate to differentiate between men and women doctors. No state medical service could ever be created except on the basis of complete equality of the sexes.

Dr. RUSSELL THOMAS from his experience as a doctor said that there was a tremendous resentment among men against being examined by women. Emotion was part of our very soul and could not be put aside. The Secretary of State would probably have to consider extending the service of civilian doctors to camps in this country when second fronts were opened in Europe. They could easily perform that function and not allow men to suffer the indignity of being examined by a woman in cold blood. It was only when illness overpowered everything else that most men were willing to put themselves into the hands of a doctor of the other sex.

Dr. H. B. MORGAN thought Dr. Thomas was wrong. This was a question whether the ordinary soldier should be examined by a woman doctor as part of her Army medical duty. These things were done quite unemotionally by the trained doctor. Sex did not matter, and from his point of view there was nothing in it at all. A very small number of people did not like to be examined nude by the opposite sex, but in such cases an appeal could always be made. Was there any reason why a woman medical officer should not examine a man with venereal disease when men examined women? He hoped the Minister would hold firm, and insist that on grounds of equality, training and public decency, the medical officer should be allowed to perform her duty and the men in question should stand up to the ordinary common discipline of the Army and the routine examination.

Mr. ARTHUR HENDERSON, Financial Secretary to the War Office, said that the nation owed a debt of gratitude to the large number of women doctors who were rendering important service today. The medical inspections to which Mr. Bellenger referred were designed mainly to detect cases of skin diseases or infestation as early as possible, and they had been carried out as a routine on all personnel returning from or proceeding on leave, or when men were being transferred from one unit to another in the United Kingdom. In future such inspections would take place only when the medical officer in charge of troops, or the senior administrative medical officer, considered it necessary. These inspections had been known as "free from infection" inspections; in future they would be called "health" inspections, and soldiers and auxiliaries would have the right to be examined by medical officers of their own sex, if they so desired. If this was not immediately possible the full inspection would be postponed. In the interim a partial inspection would be carried out at which men would be stripped to the waist and women would wear the equivalent of a bathing costume. In addition at all inspections a third person of the same sex would be present. For women this would normally be an ATS medical orderly. It was also proposed to do what was possible to encourage the conception of a clinic rather than that of a parade.

Pensions Appeal Tribunals

Sir W. WOMERSLEY, replying to a question, announced the Government had accepted his proposal that arrangements should now proceed for setting up independent tribunals to hear appeals from all classes of claimants whose title to compensation is rejected under any of the various war pension schemes administered by his department. Each tribunal will include a legal chairman, a doctor and a member of the service or class covered by the scheme under which the claim is made. It is intended to establish nine tribunals to begin with. These will sit at various centres for the convenience of appellants. Their number will be increased as may be found practicable, but owing to the difficulty which still exists in obtaining the full personnel, the increase can only be gradual. Legislation will be introduced as soon as possible after the House resumes its sittings, and active steps are being taken to complete preparations for the tribunals to begin their work with the least possible delay.

Notes and News

THE PAY OF NURSES

THE second report of the Scottish Nurses Salaries Committee, which has now appeared, is open to the same objections as the Rushcliffe Committee's first report. The Scottish scale now proposed by Prof. T. M. Taylor and his associates is on the whole lower than that recommended by the Rushcliffe Committee, but salaries recommended for student nurses are the same: £40 in the first year, rising to £60 in the fourth year and to £70 as soon as the student qualifies.

These relatively high initial salaries are not welcome. If the hospital or the local authority pays as much as £40–60 a year for a nurse there is apt to be little recognition of her student status: she is regarded and treated as a paid servant of the hospital. Again, if she is to receive a rise as soon as she qualifies—which seems sound in principle—that rise should be substantial enough to make her set a high value on her qualification. The difference between £60 and £70 is not sufficient to do this. Scottish ward sisters' salaries have now been fixed at £130 rising by increments of £10 to £160, and with two further rises—to £170 in the seventh year of service and to £180 in the tenth year. Pay at this level is too low for women carrying the responsibilities of a ward for years on end. Yet the theatre sister is to receive even less—only £125 rising by £10 increments to £155. The Rushcliffe figure (for a "departmental sister," which presumably covers theatre sister) was £140–150 rising by annual increments of £10 to £190–200 with one additional increment of £20 after 10 years' service. In this connexion it is interesting to recall a passage in John Stuart Arey's *Night Work*:

> The Sister's eyes met his, no less stoney because all had gone well so far. She was feeling in her hatred for him all the sense of anger and frustration she had against the whole hospital. It had taken from her the life she might have led, the children she might have had, and given her the dry reward of enviable skill. . . . The very perfection of the operation, borne up on her own perfect preparations for each step, was a reminder of the bleak reward that was all nursing had given her. . . . In contrast, surgery had given him a wife and a Rolls-Royce car, a sense of importance and a smug paunch.

Like the Rushcliffe Committee, the Scottish body has penalised the nurse who chooses to live outside the hospital. If she lives in, her salary is augmented by emoluments valued at sums ranging from £75 a year for a student nurse to £200 for the matron of a hospital of 500 beds and over. These values, as the Rushcliffe Committee pointed out, may be assessed in various ways: some local authorities calculate the actual cost to the hospital of emoluments provided; others fix the value at about the sum (naturally greater) which the nurse would have to pay in providing them for herself; others have taken a middle course, and probably this is what the Taylor Committee have done. It might be supposed that a nurse who lives out would receive at least the whole calculated value of her emoluments in addition to her salary; indeed she should really receive more, because the hospital, catering for large numbers, can provide amenities more cheaply than they can be bought outside. No doubt the Royal College of Nursing had this is mind in recommending non-resident allowances of £120 per annum for administrative grades, £110 for sisters and £104 for staff nurses. Yet both the Rushcliffe and the Taylor Committee have taken the opposite view: that a nurse who is non-resident from choice should receive not even the bare value of her emoluments, but only the sum left when the cost of meals taken in hospital of uniform and its laundering have been deducted. Thus the actual living-out allowance of a ward sister is only £70 on the Rushcliffe scale and for a staff nurse £65, and similar deductions are to be made in Scotland. The financial incentive to remain resident is thus very great, and one of the chief obstacles to nursing recruitment has been maintaincd and reinforced.

AMERICAN PUBLIC HEALTH CONFERENCE.—The American Public Health Association is sponsoring a war-time public health conference which is to be held in New York on Oct. 12, 13 and 14.

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"British Association of Physical Medicine"

All interested in the practice of physical medicine are invited to meet at 2.30 PM next Wednesday, May 5, in the rooms of the Medical Society of London, 11, Chandos Street, W.1, to constitute an association with the following purposes:

1. To promote a general appreciation of the value of physical medicine in the prevention and relief of human suffering.
2. To implement measures by which practitioners in physical medicine may be encouraged to attain the highest possible standard of efficiency, and to use it most effectively for the national well-being.

The agenda for this meeting have been drawn up by an inquiry committee (appointed at the informal meeting of Oct. 17, 1942) consisting of Dr. L. D. Bailey, Dr. Philippe Bauwens, Wing-Commander J. F. Bromley, Dr. Geoffrey Holmes, Brigadier Frank Howitt, Sir Morton Smart, Dr. Donald Stewart and Sir Robert Stanton Woods, with Lord Horder as chairman and Major J. W. T. Patterson as temporary secretary.

If the meeting endorses a resolution, to be moved from the chair, that the British Association of Physical Medicine is hereby constituted, it will then proceed to elect a council of twenty and to define its powers.

University of Glasgow

Five lectures will be held in the department of ophthalmology on Wednesdays at 8 PM. They will be open to medical practitioners and senior students. Dr. Alexander Garrow will speak on the young myope on May 5; Dr. C. W. Graham on ophthalmic experiences in the Middle East (May 12); Dr. James Hill on ocular tumours (May 19); Dr. George Bell on the visual physiology of the cinema (May 26); and Dr. I. S. MacGregor on toxic blindness (June 2).

At a graduation held on April 17 the following degrees were conferred:

MD.—G. H. Bell (with honours); W. S. W. Guthrie (with high commendation); * Gavin Shearer (with commendation); and Archibald McPhater.

MB, ChB.—J. F. Allan, R. P. R. Allan, Archibald Armour, Janet Y. Baird, Mary M. Baird, W. A. Baird, Joseph Berkeley, J. D. Binning, R. B. Bonar, R. P. Brittain, J. A. M. Broadfoot, H. B. Brown, R. A. P. Brown, R. J. Calvert, John Campbell, Margaret M. Chalmers, Isobel J. Cochrane, H. W. Collins, William Cormack, J. V. Coyle, M. C. Crawford, J. T. Cunningham, Russell Dallachy, W. H. C. Donald, Thomas Dougray, J. M. Dunn, L. E. Elbert, Elizabeth G. Fenwick, Catherine B. Foster, N. J. Fraser, D. J. Gracie, G. E. Griffiths, W. R. Hope, R. A. Houston, A. M. Hyndman, Niall Hyndman, S. E. Jackson, H. F. Jarvie, Anne-Marie Kivlichan, James Lapraik, Edmund Leahy, Margaret C. Leitch, Alexander Lindsay, G. G. Lindsay, S. V. Livingstone, William Lockhart, W. J. Logan, M. D. MacAffer, Hope J. B. McAlpine, Donald Macdonald, J. H. McDougall, James McFadden, Archibald Macfarlane, David McGill, A. R. McGregor, J. J. McGrotty, O. A. MacKenzie, A. H. MacLean, R. D. H. Maxwell, A. W. Mearns, R. M. Mill, J. H. Mitchell, D. S. Montgomery, J. M. Moore, Anna F. S. Neil, Margaret B. C. Orr, Millie M. J. Peralta, Muriel H. Reid, C. D. Rigg, J. D. P. Robertson, J. R. Rowell, J. M. Shaw, Archibald Smellie, H. G. Smith, Andrew Sommerville, William Thorburn, Chalmers Wood, William Wood and J. P. Young.

The Bellahouston medal for eminent merit in thesis for the MD was conferred on Dr. W. F. Anderson.

Scottish Conjoint Board

On April 16, the following having passed the final examination of the board were admitted licentiates of the Royal Colleges of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow:

G. W. M. Armistead, James Carey, James Connor, W. B. Cowper, J. E. Dawson, G. T. Donald, T. H. Forrest, B. C. Greenhill, Lore M. Hasslacher-Traub, Barbara V. Hastings, R. E. Heap, Daphne M. E. Kayton, Herbert Kraus, F. H. Leckie, James McAllister, J. J. McMurray, J. J. MacPherson, R. R. Mahlangeni, D. R. Martin, J. E. Miller, H. A. Myers, Dayand Naidoo, Caroline N. Nompozolo, R. M. Oliver, Bridget Purcell, Y. D. Sethi, J. M. Stirling, Roza Szteinhaus, and N. R. B. Turner.

Oscar Fehr, graduate of Heidelberg, a recognised university, having passed the final examination of the board was also admitted to the licentiateship.

Post-graduate Lectures in Edinburgh

A series of Honyman Gillespie lectures, open to graduates and senior students, will be held at the Edinburgh Royal Infirmary at 4.30 PM on Thursdays during May and June. Dr. Agnes MacGregor will speak on the causes of fœtal and neonatal death on May 6; Dr. W. G. Clark on the town-dweller and his environment (May 20); Dr. J. M. Dobson on the control of sepsis (May 27); Dr. E. K. Dawson on mammary cancer and the menopause (June 3); Mr. A. J. C. Hamilton on diverticulum of the urinary bladder (June 10); and Miss R. Pybus on the protective diet (June 17).

Royal Society of Medicine

On Wednesday, May 5, at 2.30 PM, Dr. H. J. Norman will read a paper to the section of history of medicine on Dr. John Bulwer, a pioneer in the treatment of the deaf and dumb. At 4.30 PM on the same day, the section of surgery will hold a clinicopathological meeting. On May 7, at 10.30 AM, Mr. T. E. Cawthorne and Mr. C. S. Hallpike will speak on Menière's disease, and at the section of laryngology, at 2.15 PM on the same day, Dr. George Bray, Prof. C. J. Polson and Lieut.-Colonel Myles Formby will open a discussion on nasal allergy, excluding hay-fever. At the same hour the section of anæsthetics will meet to hear short papers and to see a film by Dr. Ronald Jarman demonstrating 'Pentothal Sodium' anæsthesia.

Naval Honours

The MBE has been awarded to T/Surgeon Lieutenant J. K. Thomson, MB Edin., RNVR, for skill and devotion in tending wounded survivors from a torpedoed merchantman.

T/Surgeon Lieutenant J. M. Clow, FRCSE, RNVR, has received the Albert medal in gold for gallantry in saving life at sea:—

Clow was between decks when HMS *Ibis* was badly damaged. Wounded men were brought to him in the sick bay, among them an Eng. RA badly burnt about the arm. Clow gave him an injection of morphia, and, as the ship was now sinking, helped the man on to the upper deck. As the man had no lifebelt he put his own on him. Then he got him into the water and made sure he was free of the ship before he himself abandoned it. In doing this Clow became entangled in the rigging and was taken down some way before he got clear. He then swam for three hours without a lifebelt before he was picked up.

Appointments

BARCLAY, R. C., MB: RMO at Royal Cancer Hospital (Free), London.
BOURNE, ALECK, MB CAMB., FRCS, FRCOG: consulting gynæcologist to the Charterhouse Rheumatism Clinic, London.
COLBECK, J. C., MB LOND: pathologist for Warwickshire.
OLIVER, G. B., MRCS: H.M. inspector of factories.
SANDEMAN, F. W., MB GLASG.: medical referee for the sheriff-court districts of Glasgow, Lanark, Hamilton and Airdrie.
WOLLASTON, F. L., FRCS: RSO at Papworth Village Settlement.
YATES, F. H., MRCS: asst. pathologist to the Bolton Clinical Laboratories.

Births, Marriages and Deaths

BIRTHS

DOEY.—On April 20, in Oxford, the wife of Squadron-Leader William Doey, MB, RAFVR—a daughter.
MARSHALL.—On April 18, at Cheltenham, the wife of Dr. A. G. Marshall—a son.
O'FLYNN.—On April 22, in London, the wife of Dr. T. D. O'Flynn, Chorleywood, Herts—a son.
PHILLIPS.—On April 13, at Lytham, Lancs, the wife of Squadron-Leader Basil Phillips, MRCS, RAFVR—a son.
SHAWCROSS.—On April 22, at Sutton, the wife of Dr. E. W. H. Shawcross—a son.
TEMPLE.—On April 17, to Dr. Barbara Temple, DMR, wife of Mr. Leslie J. Temple, FRCS—a son.
TWENTYMAN.—On April 19, the wife of Dr. Ll. R. Twentyman—a daughter.
WALKER.—On April 17, at Plymouth, the wife of Surgeon Lieutenant John Walker, RNVR—a daughter.

MARRIAGES

BOWLES—MORGAN.—On April 10, at Meerut, India, A. E. Bowles, pilot-officer, RAFVR, to Elizabeth Mary Morgan, lieutenant, IMS.
BEARLEY—MANSFIELD.—On April 17, at Reigate, Brian Fenton Brearley, surgeon lieutenant, RNVR, to Olive Mansfield.
FORRESTER-WOOD—BROCKLEHURST.—On April 17, in London, William Rodney Forrester-Wood, FRCS, of Hove, to Jean Brocklehurst.
MAYER-DRAGE.—On Feb. 16, in the Middle East, John Henry Mayer, FRCS, major RAMC, to Pam Drage, ATS.
RYLE—JACKSON.—On April 10, in London, John Creagh Ryle, surgeon-lieutenant, RNVR, to V. Melody W. Jackson.
SMITH—WALKER.—On April 16, at Banbridge, co. Down, Joseph Francis Smith, MB, surgeon lieutenant RNVR, to Hilda Walker.

DEATHS

BENTON.—On April 21, at Manchester, Graham Miles Benton, MB MANC., DA, of Mauldeth Road, Withington.
DENNY.—On April 20, Herbert Reginald Harry Denny, CB, MRCS, surgeon rear-admiral, RN, aged 66.
FOOKS.—On April 23, at Bournemouth, George Ernest Fooks, MRCS, lieut.-colonel late IMS, aged 86.
LAMBRINUDI.—On April 21, at Mayfield, Constantine Lambrinudi, BA CAMB., FRCS, aged 53.
YORKE.—On April 24, at Prenton, Birkenhead, Warrington Yorke, MD LPOOL, FRCP, FRS, aged 60.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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LYTIC AGENT AND INHIBITORY FACTORS IN HUMAN TISSUE AND SERA

CHANGES IN SERUM INHIBITOR FACTOR IN BLACKWATER FEVER

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IN another communication[1] the lytic effect of washed animal tissues on red blood-cells of the same species and the inhibition of this lysis by certain dilutions of homologous and heterologous sera is described. In view of these observations it is suggested that the degree of lysis occurring at any given time in the tissues may be determined by the balance of the lytic agent in the tissues over the inhibiting agent in the serum (and tissues)—i.e., reduction of the inhibitor will increase red-cell destruction and vice versa. It is further suggested that such reduction of inhibition may be the mechanism underlying the increased lysis observed in the hæmolytic crises of such conditions as blackwater fever.

In this paper we record the preliminary results of investigations into the inhibitor content of sera of patients suffering from the effects of blackwater fever.

DEMONSTRATION OF LYTIC AGENT AND INHIBITOR IN HUMAN TISSUE AND SERUM

Recently a patient was admitted to a West African general hospital dying of multiple injuries sustained in a road accident. Blood was removed 4 hours before death from an arm vein, defibrinated and serum separated. The cells were stored in the cold as a suspension in 5% glucose buffered saline.

The patient died 24 hours after admission and tissues were removed aseptically within 5 minutes of death. Specimens of lung, spleen and liver were cut and suspended in saline and left for 6 hours on ice before use. As soon as possible after removal of the tissues, tissue + red-cell suspension systems were set up in biologically and chemically cleaned test-tubes in the standard manner described elsewhere. Thus :—

Tubes 1 and 2 : Washed lung + cells.
Tubes 2 and 3 : Unwashed lung + cells.
Tubes 3 and 4 : Washed lung + homologous serum (final dilution 1/100) + cells.
Tubes 5 and 6 : Heated lung + cells.

This arrangement was repeated for spleen and liver. Control tubes contained cell suspension only. Serum added was obtained from the patient and diluted in glucose-saline and added to requisite tubes so that the final dilution was 1 in 100.

In all tubes the final suspension of red cells was adjusted to approximately 250,000 per c.mm. Tissues were cut in slices approximately 4 mm. square by 2 mm. deep. "Heated" tissue was first heated in glucose-saline to 80° C. for 5 minutes, then washed in glucose-saline and added to the cell suspension.

TABLE I—LYSIS OF HUMAN RED CELLS BY HUMAN TISSUE

System (All in duplicate)	*Result*
(1) Red cells + washed lung	L
Red cells + washed spleen	L
Red cells + washed liver	L
(2) Red cells + washed lung + serum 1/100	O
Red cells + washed spleen + serum 1/100	O
Red cells + washed liver + serum 1/100	PL
(3) Red cells + unwashed lung	L
Red cells + unwashed spleen	O
Red cells + unwashed liver	PL
(4) Red cells + heated lung	O
(5) Controls. 4 tubes cell suspension.	All O

L = Lysis. PL = Partial lysis. O = No lysis

The tubes were incubated in a dry incubator at 37° C. for 24 hours, read and then re-examined at 36 hours. The degree of hæmolysis was measured microscopically by comparison of samples of fluid removed from violently shaken tubes with samples of control suspensions removed at the same time. The results obtained are set out in table I.

It will be seen that the results with human tissue and cells are substantially those obtained with animal tissue and cells—namely

(*a*) Human tissues (lung, spleen, liver) contain an agent capable of lysing homologous red cells.
(*b*) Human serum contains a factor which can inhibit this lytic action.
(*c*) The lytic agent is destroyed by heat, at any rate in the lung.
(*d*) An inhibitory agent can be demonstrated in human tissues as well as serum.

In the above experiment, which has not yet been repeated because of the difficulties of obtaining further suitable subjects, the tissues after removal from the body were immediately placed in glucose-saline ; this probably accounts for the irregular results with "unwashed" tissue—e.g., lung.

INHIBITORY FACTOR IN NORMAL HUMAN SERUM

For the examination of the inhibitory factor in normal and abnormal human sera, both the guineapig lung + guineapig cell suspension and monkey spleen + monkey cell suspension systems were employed at various times.

The setting up of these systems was essentially as described above for human tissues, the final suspension of cells again being approximately 250,000 per c.mm. The results are set out in table II.

TABLE II—INHIBITORY EFFECT OF HUMAN SERUM ON TISSUE + RED-CELL SUSPENSION SYSTEMS

(*a*) *Monkey spleen + monkey red-cell suspension system*

Serum	Dilutions							Controls	
	1/20	1/40	1/80	1/160	1/320	1/640	1/1280	Suspension	Sera + suspension
Normal B	O	O	O	O	O	PL	L	O	O
Normal C	O	O	O	O	O	O	O	O	O
Normal T	O	O	O	O	O	O	O	O	O
Dried plasma	O	O	O	O	—	—	—	O	O

(*b*) *Guineapig lung + guineapig red-cell suspension system*

	1/10	1/50	1/100	1/150	1/250	1/350		
NHM	L	—	O	—	O		O	O
NHM	—	L	—	O	—		O	O
D	—	L	PL	O	O		O	O
CL	—	—	L	O	O		O	O
M	—	—	O	—	O	L	O	O

L = Lysis. PL = Partial lysis. O = No lysis.
(—) = No experiment.

It can be seen from these results that human serum exerts an active inhibitory effect on tissue hæmolysis in both monkey and guineapigt issue + red-cell systems.

It will also be observed from the results of the monkey tissue + red-cell experiments that it is possible to dilute the inhibitory agent to a point beyond which it becomes inactive. This has also been observed with guineapig tissue + red-cell systems, but the final dilutions for normal human sera have not yet been worked out.

Lysis of guineapig red cells by low dilution of human sera.—It will be seen from table II (*b*) that lysis occurred in guineapig tissue + red-cell systems, on the addition of human sera in low dilutions—i.e., 1/10, 1/50 and 1/100. At greater dilutions the lysis of red cells was inhibited by these same sera.

On further investigation it was observed that the lysis in the low-dilution tubes appeared to be fundamentally different from that in the control tissue + red-cell system and in tubes in which the serum was very dilute (e.g., 1/350). Thus, lysis in the low-dilution tubes was complete in 3–5 hours, whereas, as stated above, lysis in the tissue + red-cell systems did not commence appreciably for at least 12 hours and was not completed

1. Maegraith, B. G., Findlay, G. M. and Martin, N. H. *Brit. J. exp. Path.* April, 1943 (in the press).

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for 24 hours. The rapidity of lysis on the addition of low dilutions of serum was confirmed by repeated experiment. The effect of the addition of normal sera to guineapig red-cell suspensions alone was next examined and it was found that lysis occurred at the same dilutions as had been observed in the experiments tabulated in table II (*b*). Other sera were tested with similar results—e.g., serum obtained from a transfusion donor in a case of blackwater fever gave the following results when added to guineapig cell suspensions :—

Serum dilution		
1/100	1/150	1/200
L	0	0

The mechanism of this lytic effect of human serum on suspensions of guineapig red cells is being further investigated. The lysis itself fortunately does not interfere with the use of the guineapig tissue + red-cell system as a standard indicator system (see below), for the lytic effect does not exhibit itself at dilutions greater than 1/100, beyond which the tissue + cell lysis is inhibited by human sera.

INHIBITORY FACTOR IN BLACKWATER FEVER

In the following experiments both guineapig and monkey tissue + red-cell preparations were used as indicator systems for the inhibitor. These experiments are as yet very incomplete, but are being continued when suitable material becomes available.

A study of table II (*b*) will show that normal human serum, apart from the "zone" phenomenon referred to above, inhibits lysis of guineapig cells by guineapig lung in dilutions of 1/100 up to at least 1/250. It was taken, therefore, that failure to inhibit lysis at these dilutions was a sign of reduction of normal inhibitor content.

Of the 3 "normal" sera titred out (table II *a*), inhibition was observed in 2 up to a dilution of 1/1280 and partial inhibition in 1 at 1/640. "Normal" limits of complete inhibition were therefore arbitrarily taken at 1 in 320 or higher.

Using these criteria of "normality" of inhibitor content the results shown in table III were obtained.

TABLE III

(*a*) *Monkey tissue + red-cell system*

Normals : See table II (*a*)

Serum	Dilutions of sera					
	1/40	1/80	1/160	1/320	1/640	1/1280
BL. Blackwater fever (a.h.)	0	0	PL	—	—	—
T. Blackwater fever (a.h.)	PL*	0	0	0	L	L
T. Blackwater fever (recovered)	0	0	0	0	0	0
Ad. Acute stage of malaria	0	0	0			

Controls : Cells = 0. Cells + tissue = L.
* PL. This lysis was complete within 3 hours. a.h. = sera removed from patient during active hæmolysis.

(*b*) *Guineapig tissue + red-cell system*

Normals : See table II (*b*)

Serum	Dilutions of sera		
	1/160	1/200	1/320
BWF. L1 (after lysis)	0	—	0
BWF. L2 (24 hrs. after lysis)	PL	—	0
BWF. L3 (during lysis)	L	—	L
BWF. L (during lysis)	L (1/150)	L	—

Controls : Cells = 0. Cells + tissue = L. BWF. L3, against red-cell suspension = lysis at 1/100 ; none in higher dilutions.

It will be seen that in the sera obtained from the few cases of blackwater fever so far examined there is a substantial reduction in the "titre" of inhibition of tissue + red-cell lysis, both in monkey and guineapig systems, during the hæmolytic crises. Thus, in case T (table III *a*) lysis was inhibited at a dilution of 1/320 by serum removed in the active hæmolytic stage and by 1/1280 by serum removed from the same patient during convalescence.

The results obtained in case L are even more striking. In this case blood was removed from the arm vein at the following stages of the case :

(1) At the finish of the first hæmolysis, when there was still a trace of blood pigment in the urine. (Hb. 65% ; red cells $3{\cdot}1 \times 10^6$ per c.mm. ; serum clear.)

(2) Twenty-four hours after hæmoglobinuria had ceased. (Hb. 67% ; serum clear).

(3) At height of second hæmolysis, 6 hours after appearance of Hb. in urine. (Hb. 45% ; red cells $2{\cdot}0 \times 10^6$ per c.mm. ; serum contained blood pigment visible to the naked eye.)

Serum (1) inhibited lysis in a guineapig red-cell system at 1 in 160 ; serum (2) inhibited lysis incompletely at 1 in 160 and completely at 1 in 320 ; and serum (3) failed to inhibit lysis even at 1 in 320.

Thus, in the one patient the inhibitory powers of the serum appeared to vary with the presence or absence of a lytic crisis ; serum withdrawn during hæmolysis appeared to have little or no inhibitory activity.

The presence of blood pigments in the serum during the crisis might have been a factor in this loss of inhibitory power, but this was not found to be so (table III *b*) control system of serum + cells). Further it has been our experience in animal experiments that even badly lysed sera do not in themselves affect the tissue + cell lysis except within normal limits.

The recorded loss of inhibitory activity in the serum in the active lytic stage of the disease seems to be significant and indicative of the fact that at this stage the balance between tissue hæmolysis and inhibitory factor within the body of the patient is upset in the direction of lysis.

TABLE IV

System	*Result*
Patient's cells (control)	0
Patient's cells + tissue	L
Patient's cells + tissue + donor's serum 1/100	0
Patient's cells + tissue + donor's serum 1/200	0
Donor's cells (control)	0
Donor's cells + tissue	L
Donor's cells + tissue + donor's serum 1/100	0
Donor's cells + tissue + donor's serum 1/200	0

In this particular case (BWF. L) an attempt was made to detect significant differences between the corpuscles of the patient and those of his donor. Cell suspensions in glucose-saline were made from both patient (during lysis) and donor and diluted down to a standard 500,000 per c.mm. Tissue in the form of gland and muscle was obtained at operation from a patient of homologous blood-group, and human tissue (mixed gland and muscle) + red-cell suspension systems were set up as described above. In each case, in addition, a series of dilutions of both donor's and patient's sera were added to the tissue + red-cell systems. Unfortunately, some tubes became infected and the results had to be discarded, but in the tubes remaining sterile the results (table IV) indicated no appreciable differences between the cells of the patient and donor.

A short clinical summary of this case is appended to this report.

DISCUSSION

It has been shown that human tissues and sera behave in vitro in the same manner as monkey and guineapig tissues and sera :—

(1) Slices of human tissue (lung, spleen, liver) will lyse saline suspensions of washed human red cells—i.e., human tissues contain a lytic agent.

(2) Human serum over a range of dilutions will inhibit this lytic reaction—i.e., human serum contains an inhibitory factor.

Further, it has been demonstrated that the inhibitory properties of human serum vary during the course of blackwater fever, being greatly reduced during the actual hæmolytic crisis.

It is therefore suggested that at least one of the factors involved in the development of the abnormal degree of lysis in blackwater fever is a reduction in the activity of the circulating inhibitor, with the result that in blackwater fever the balance between the tissue lytic agent and

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the inhibitory factor is upset in the direction of lysis. This amounts to saying that in blackwater fever there exists no abnormal lysin; rather *the lysis is simply a manifestation of excessive uninhibited activity of a normal lytic process.*

The ultimate factors which determine the reduction in inhibitory action of the serum must still be sought. It may be that the presence of the malaria parasite in the tissues or circulating blood, or the sudden access of large concentrations of quinine (as has often been observed clinically in the West Africa Command), or, again, the effects of severe muscular exercise, may be important means of reducing the inhibitory control of the tissue lytic agent (which from our former work we consider to be an erythrocytase), thus precipitating hæmolytic crises. On the other hand, it may be that the failure of the inhibitor activity of the sera from blackwater fever cases is not so much the quantitative loss of inhibitor as the presence of some factor which itself inhibits the inhibitor, such as certain blood pigments or their degradation products—e.g., bile in the late stages of the disease.

So far we have observed no such effect from circulatory blood pigments: samples of sera withdrawn from the patient during active lysis have not been found to lyse suspensions of guineapig cells beyond the normal range of dilutions. (See text).

No solution has yet been found as to whether one or both of these mechanisms comes into play in inducing the acute hæmolytic crises of blackwater fever, but it is felt that the use of the tissue + red-cell suspension indicator system, described above and elsewhere, provides a new means of tackling these problems.

If, as is suggested, hæmolysis depends on the balance of the two opposing forces—a species-specific lytic agent widely distributed in the tissues and a non-specific inhibitory factor present in both tissue and serum—increased hæmolysis might conceivably occur either as the result of (*a*) excess of the lytic agent or (*b*) reduction in quantity or effect of the inhibitory factor. The second condition has been shown to occur in blackwater fever.

The relation of the lytic agent-inhibitor balance to other forms of lytic anæmia must be determined by future experiment, but in such conditions as march hæmoglobinuria and the Marchiafava-Micheli syndrome, in which the Donath-Landsteiner reaction is negative, it may well be that there is some similar imbalance. It is also possible that the acute hæmolytic effects of certain chemical substances, such as arseniuretted hydrogen, may be due to an interference with either the production or action of the serum inhibitor.

In an African suffering from an acute hæmolytic crisis due to sickling of the red cells, associated with hæmoglobinuria, the serum when titred out showed no reduction in inhibitory factor. Sickling in this patient could be demonstrated both in vitro and in vivo. This form of lysis is apparently due to the rapid destruction of abnormal red cells which in a person with the sickling trait can be caused by a reduction in oxygen tension.

SUMMARY

1. Human tissues have been shown to lyse saline suspensions of washed red cells.

2. Human sera have been found to inhibit this lysis.

3. The activity of the inhibitory factor in sera from cases of blackwater fever has been titred out and found to be reduced during hæmolytic crises.

4. An explanation of the increased hæmolysis in blackwater fever is suggested—namely, that the reduction in the activity of the inhibitory factor has disturbed the balance of lytic agent and inhibitor to the lytic side.

APPENDIX

The following are clinical notes of the case of blackwater fever (BWF. L)—

Cpl. L., aged 45, had served in West Africa for 10 months. In the previous war he contracted malaria in Iraq in 1917, and for the next two years while in India and the United Kingdom had periodic attacks, usually self-treated with quinine. After 1919 he had no further malaria. For the first 4 months of his tour in West Africa he was healthy, although he lost weight: then about every month he began to have attacks of bilious vomiting with fever. These bouts he treated himself with quinine grains 10–15 daily. He had only one attack of microscopically diagnosed malignant tertian malaria, in September, 1942, when in hospital with a broken ankle. The patient was alcoholic (4–5 large bottles of beer a day and/or 4–5 whiskies) and a heavy smoker with a chronic bronchitic cough.

On Dec. 13, 1942, he had an attack of fever, nausea and vomiting self-treated with quinine. On the 26th he was feverish all day and out of sorts; self-treated with quinine and attributed to the Christmas festivities. Next day he woke at 02.00 hours very cold and shivering: at 09.00 hrs. he vomited greenish bile and stated that he had headache and pain in the loins, more especially in the left kidney region and in the left groin. At 13.00 hrs., he states, he passed port-wine-coloured urine; but he did not report sick till 15.30 hrs. after again passing similar urine, acid in reaction and with albumin, hæmoglobin and granular casts and debris. He was given alkalis, and forced fluids by mouth.

At 17.50 hrs. blood-pressure was 126/85, hæmoglobin 65%, red cells 3,100,000 per c.mm. (Blood taken for examination of inhibitory factor: table III (*b*), serum BWF. L1.) No malaria parasites seen. By 19.00 hrs. the urine was alkaline and yellow in colour with no hæmoglobin demonstrable spectroscopically (1395 c.cm. till midnight). On Dec. 28 he complained of pain in the splenic region and back with cough and much frothy sputum: at 10.30 hrs. BP 115/85, hæmoglobin 67%. (Blood taken for examination of inhibitory factor: table III (*b*), serum BWF. L2.) Urine continued clear all day with an alkaline reaction and no albumin or hæmoglobin till 21.15 hrs. when a further hæmolysis took place, and 10 oz. of urine of a dark port-wine colour, neutral in reaction, was passed. BP 96/55, hæmoglobin 45%, red cells 2,100,000 per c.mm. At 23.55 hrs. hæmoglobin 45%, red cells 2,000,000 per c.mm. (Blood taken for examination of inhibitory factor: table III (*b*), serum BWF. L 3.) Total volume of urine in 24 hrs., 78 oz.; vomit 10 oz.

On Dec. 29 the urine was alkaline; it gradually became lighter during the day but contained albumin and hæmoglobin: total output, urine 24 oz., vomit 36 oz. At 05.30 hrs. BP 105/60, hæmoglobin 40%, red cells 1,800,000 per c.mm.; at 09.00 hrs., hæmoglobin 35%, red cells 1,400,000 per c.mm. A blood-transfusion was begun at 12.00 hrs. and was followed 45 min. later by a rigor (T. 106° F., pulse 128, respirations 30). The transfusion was persisted in, at the rate of 3–4 drops a minute for 24 hrs., by which time 426 c.cm. of group O (IV) homologous blood had been given without further incident. At 17.30 hrs., hæmoglobin 35%; at 23.55 hrs., hæmoglobin 32%. Blood-urea 63 mg. per 100 c.cm.

On Dec. 30 the urine at 05.30 hrs. was light straw-coloured, alkaline and without albumin or hæmoglobin. Total urine output for 24 hrs., 57 oz.; vomit 4 oz. At 07.45 hrs. BP 106/40, hæmoglobin 32%, red cells 1,600,000 per c.mm. At 11.00 hrs. the temperature rose to 103° F.; very pale, jaundiced and sweating. Cheyne-Stokes breathing with dilated heart and intense pulsation over the precordial and hypogastric areas, and of the veins in the neck; very restless and only partially conscious. Oxygen given. Hæmoglobin 35%, red cells 1,800,000 per c.mm. At 14.00 hrs. T. 105° F.; very marked Cheyne-Stokes breathing; cyanosed. During the afternoon the general condition improved and the temperature fell. On Dec. 31 the urine continued free from albumin and hæmoglobin; hæmoglobin 35%, red cells 1,600,000 per c.mm.

Thereafter, the patient's condition slowly improved but the hæmoglobin percentage remained from 30 to 32 till Jan. 5, when after 48 hrs. on iron and 'Neohepatex' it rose to 40. Further progress was uneventful.

The case was thus a typical instance of blackwater fever with two hæmolytic crises, ending in recovery.

TRAINING STAFF FOR WAR-TIME NURSERIES.—The National Society of Children's Nurseries, with the Royal College of Nursing and the Association of Sick Children's Hospital Nurses, is holding a fortnight's course next July for nurses eligible for positions as matrons and sisters in war-time nurseries. The course is given under the auspices of the Ministry of Health. The course begins on Monday, July 14, and is to be held at the Royal College of Nursing, 1a, Henrietta Place, W.1. It will be free to nurses on the general and sick children's state registers, who undertake to work in these nurseries, and registered fever nurses can also be accepted if they are unable to take employment in infectious-diseases hospitals. Applications should be sent to the director of the education department of the college.

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IMMEDIATE DEATH AFTER USE OF INTRAVENOUS MERCURIAL DIURETICS

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SINCE Saxl and Heilig (1920) introduced 'Novasurol' for the treatment of cardiac œdema, mercurial diuretics have been widely used, and there have been remarkably few toxic manifestations. Ulceration at the site of injection through lack of care in getting the diuretic into the vein has been the most common complication. Of other toxic effects encountered with these drugs, a syndrome characterised by muscle pains, somnolence, delirium and occasionally coma has been described by Poll and Stern (1937). They ascribed this to chloride depletion from increase in chlorides excreted in the urine, and it may be produced in the same way by any other potent diuretic. Tetany and attacks of epilepsy have also been attributed to this cause. Miller and Smith (1931) showed that œdema fluid in digitalised cats contained appreciable amounts of digitalis; and De Graff and Nadler (1942) maintain that symptoms of digitalis toxicity may develop when œdema is lost in digitalised patients. Care should therefore be used in giving these diuretics to patients receiving digitalis, though the risk seems small except possibly when massive doses are being given. Various reactions such as fever, rashes, tremor, tinglings in the arm, stomatitis, nausea, vomiting, diarrhœa and colitis, thoracic constriction, swelling of lips and even anuria have been reported; Fox, Gold and Leon (1942) reported a patient who showed such reactions to 'Novurit' but not to mersalyl. Another reaction is the precipitation of an attack of acute gout. De Graff and Nadler (1942) give a full review of the published work on these reactions.

Much the most important but fortunately a rare reaction to mercurial diuretics is immediate death, so sudden that the patient is sometimes dead before there is time to remove the needle from the vein. The first of these was reported by Wolf and Bongiorno (1931) in a child aged 4 years with nephritis type 2, (Ellis 1942), who died immediately after the fifth injection of 1 c.cm. of salyrgan. Sundaram (1934) reported the case of a boy of 10 years with rheumatic heart disease who complained of sudden pain in the chest and died after his first injection of 0·5 c.cm. salyrgan in 10 c.cm. of saline. Cadbury (1936) reported a woman aged 21 with nephritis who died within 5 minutes of her third injection of 2 c.cm. salyrgan, and a boy aged 5 years, also with nephritis, who died 10 minutes after an injection of 0·6 c.cm. salyrgan. Sudden death after the use of 'Neptal' intravenously was reported by Greenwald and Jacobson (1937); two children aged 2 and 3 years, both with nephritis type 2, died immediately after their third injection of the drug. Tyson (1941) was responsible for bringing this complication to the fore at the present time. She reported two cases, both with a type 2 nephritis, one in a child aged 3 years and the other in a man of 27. The first was after a second injection of 2 c.cm. 'Mercupurin'; the second after a third injection of 'Esidrone.' Since Tyson's report, seven more fatal cases have been added, four by Brown and his colleagues (1942) after mercupurin; these were in a man of 68 with angina, a woman of 48 with syphilitic aortitis and two women of 60 and 52 with hypertension. The last patient had attacks of orthopnœa 18 times in 19 consecutive injections. Barker, Lindberg and Thomas (1942) reported the deaths of a man aged 59 with coronary sclerosis and tabes and of a woman aged 64 with hypertension who had already had 200 injections; these both received salyrgan. They also reported the case of a woman aged 48 with nephritis type 2 who died after mercupurin.

These amount to fifteen sudden deaths after the intravenous injection of mercurial diuretics published since 1931. There are other reported cases in which the drug was used in seriously ill patients, but these seem to confuse the picture and have therefore been omitted.

The following six cases of immediate death following intravenous mercurial diuretics have occurred in hospitals now in sector 2 of the London region since October, 1936, representing about 1000 occupied beds. We have not included a case in which a recent coronary thrombosis was found at autopsy.

CASE-RECORDS

CASE 1.—Male; age 15 years; hairdresser; admitted Sept. 3, 1936. Diagnosis: nephritis type 2. Scarlet fever as a child; no history of other sore throat. Day before admission felt ill, vomited and refused food. On admission, no headache or sore throat; pale puffy face; œdema of feet and ankles, very slight œdema of lumbar pads; tongue moist; tonsils large but not inflamed; apex beat ½ in. outside mid-clavicular line; BP 135/80 mm. Hg; chest, abdomen and CNS clear. Urine: acid; sp. gr. 1025; albumin 7/8 vol.; occasional red cells and epithelial cells; staphylococci and streptococci. Blood: red cells 5,100,000 per c.mm.; Hb. 94% (photo-electric cell); white cells 4800 per c.mm. (polymorphs 52%, lymphocytes 40%, large hyalines 7%). Plasma chlorides 0·46%. Plasma proteins 4·25%. Blood-urea 0·037%.

Renal efficiency tests

Volume	PSP	Urea secretion	Standard clearance
50 c.cm.	71%	3·3	81
60 c.cm.	18%	3·24	87

During 5 weeks' stay in hospital, in the first week of which he was treated with diet confined to one pint of orange juice daily, his blood-pressure remained about 130/80 mm. Hg and urine still contained 7/8 volume of albumen; his blood-urea rose to 0·051%. He was treated for boils on the arm with 0·2, 0·4 and 0·5 c.cm. of 1/10 staphylococcal toxoid. His œdema increased. He gained weight from 9 st. to 10 st. 10 lb. He was given an intravenous injection of 2 c.cm. salyrgan on Oct. 14 after ammon. chlor. gr. 30 t.d.s. on the 13th. The response was poor (26 oz.), so on Oct. 18 he was given intravenously 4 c.cm. salyrgan undiluted. During this injection he collapsed and died. There was no autopsy.

CASE 2.—Housewife, age 51; admitted Sept. 3, 1937. Diagnosis: myxœdema; nephritis type 2. Three weeks before admission first noticed painful swelling of ankles, worse on standing; felt cold; vomited after meals; getting paler and skin getting drier and cracking. Day before admission noticed swelling of hands. On admission, fat, pale, flabby woman, mentally sluggish, with scanty dry hair, deficient eyebrows, dry skin, puffy face; teeth carious; throat clear; gross œdema of legs and feet; heart, no abnormality; BP 145/110 mm. Hg; chest, many rhonchi scattered throughout. Urine: sp. gr. 1011; albumin ¼ vol.; leucocytes and epithelial cells; sterile. Blood: red cells 3,900,000 per c.mm.; Hb. 82% (photo-electric cell); white cells 8000 per c.mm. (polymorphs 64%, lymphocytes 25·5%). Basal metabolic rate 77% normal. Plasma protein 4·3%. Blood cholesterol 1·20%. WR negative. Urine output 20–30 oz. daily. Blood-urea 0·045%.

Renal efficiency tests

Volume	PSP	Urea secretion	Standard clearance
25 c.cm.	16·6%	1·8	43
20 c.cm.	10%	2·1	45

She was treated with thyroid gr. 1 t.d.s. and her fluids were restricted to one pint of orange juice daily for the first week. In view of the persistence of severe œdema, 10 days after admission she was started on salyrgan 2 c.cm. intravenously twice a week with ammon. chlor. gr. 30 t.d.s. the day before. The salyrgan was not diluted. The response was moderately good (45, 50, 66 oz.). Two minutes after the fourth injection, on Oct. 29, she called for water, retched, gasped and died.

Autopsy: nephritis acris in intermediate stage. Pituitary insufficiency.

CASE 3.—Male; age 51; plate-layer. Diagnosis: chronic rheumatic carditis; heart-failure.

First admitted Jan. 21, 1941, with 13 months' history of shortness of breath on exertion and swelling of ankles and face; occasional cough and attacks of giddiness; no past history of rheumatic fever. On admission, slightly cyanosed and dyspnœic; pitting œdema of ankles; pulse 76 per min., regular; apex-beat 1 in. outside nipple line; rumbling diastolic murmur in mitral area; BP 140/100 mm. Hg; chest, scattered rhonchi, crepitations at right base; liver palpable 2 in. below right costal margin; no ascites; CNS normal. Urine: sp. gr. 1024; no albumin.

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Treated by rest in bed for 7 weeks. Fluid intake restricted to 1½ pints daily. Œdema rapidly subsided and dyspnœa relieved.

Second admission on May 10, 1941. Worked for 3 weeks after discharge. Then shortness of breath returned with swelling of feet and abdomen, and had to take to his bed. Since this time has been in bed. On admission, cyanosed and dyspnœic: gross œdema of legs and back; enlargement of neck veins; pulse 96 per min., regular; apex-beat in 6th space, just outside nipple line; triple rhythm at apex; BP 125/85 mm. Hg; respirations 26 per min.; chest, scattered rhonchi, crepitations at both bases; obvious ascites; liver palpable to umbilicus. Urine: sp. gr. 1024; trace of albumin. Wassermann and Kahn reactions negative. Blood-urea 0·033%. Blood: red cells 4,300,000 per c.mm.; Hb. 62% (Haldane); white cells 18,000 per c.mm. (polymorphs 78%).

After a week in hospital there was no reduction in œdema. Mersalyl 2 c.cm. diluted to 10 c.cm. with normal saline was then given intravenously twice weekly with excellent response and no reactions; diuresis 4–7½ pints. Each injection was preceded by ammon. chlor. gr. 30 2 hours earlier. During the sixth injection on June 22, the patient complained of pain in his arm and seemed alarmed soon after the injection started. After 5 c.cm. of the diluted solution had been injected he complained of severe pain in the chest and became very distressed. The injection was stopped, but the patient collapsed and died 5 minutes later.

Autopsy (June 23).—Slight general wasting. Considerable post-mortem decomposition of all tissues. Pericardial effusion (2 oz.); milk spot (6×1 cm.) on anterior surface right ventricle; dilatation (17 cm. circum.) of left ventricle and about 19 cm. circum. of right; slight fibrous thickening of cusps of mitral valve with fusion producing stenosis down to a slit 3 cm. long; hypertrophy (0·7 cm. thick) of right ventricle. Fibrous adhesions obliterating pleural cavities; œdema, congestion and acid digestion of bulky emphysematous lungs. Reticular congestion of liver. Œdema and congestion of spleen and kidneys. Two splenunculi (1·3 cm. diam.) in hilum of spleen. No material was taken for section because post-mortem decomposition would have obliterated any finer cellular changes.

CASE 4.—Housewife, age 47; admitted Feb. 15, 1941. Diagnosis: nephritis type 2. In August, 1939, had hypopyon ulcer of left eye treated by iridectomy at Guy's Hospital. A month later eye again irritable and treated by diathermy and atropine at Moorfields Hospital; eye then excised for sympathetic ophthalmia. Keratitis continued in right eye in spite of NAB injections. For 3 weeks before present admission had felt griping pain round the trunk relieved by vomiting, and for 2 weeks had noticed puffy face and swelling of feet, legs and hands. Oliguria to 10 oz. a day. No visible hæmaturia. No sore throats. On admission, moderately nourished; left glass eye; considerable pitting œdema of lumbar pads and shins; no anæmia; apex beat in midclavicular line; BP 100/80 mm. Hg. Chest, crepitations at both bases. Considerable ascites. Urine: sp. gr. 1030; albumin 1/3 vol.; many leucocytes, red cells and hyaline and granular casts. Blood-urea 0·067%. Plasma proteins 6·7%.

Her fluids were restricted to one pint daily. On alternate days she was given 1 c.cm. of salyrgan diluted with an equal amount of saline. She had three injections. The response to the first two was poor (22, 24 oz.). During the third injection, on Feb. 25, she vomited, collapsed and died. There was no autopsy.

CASE 5.—Male; age 57; a presser by trade; admitted Aug. 20, 1941. Diagnosis: arteriosclerosis; old cardiac infarction; congestive heart-failure. In September, 1939, was an inpatient with a coronary thrombosis. Since then had attended outpatients with œdema of legs, urine showing varying quantities of albumin; cardiac enlargement; blood-pressure low. Had been treated with weekly injections of salyrgan 2 c.cm. intravenously, and once had a reaction with severe colicky abdominal pain. During 3 weeks before admission legs became more swollen. On admission, fat, cheerful; gross pitting œdema of legs and lumbar region; tongue moist; chest clear; heart sounds distant with gallop rhythm at apex; BP 100/75 mm. Hg; liver palpable four finger-breadths below costal margin; gross ascites. Urine: sp. gr. 1005; trace of albumin. Hb. 98% (Sahli). Plasma proteins 5%. Blood-urea 0·045%.

On Sept. 8 he was given 250 c.cm. of double strength serum intravenously in an attempt to raise his plasma proteins, but with little result. He was treated with 2 c.cm. injections of neptal intravenously twice weekly, with ammon. chlor. gr. 30 t.d.s. the day before. The result was good, output being up to 90 oz. daily. On Sept. 17 he was to go home next day and was given his last intravenous injection of neptal. Two minutes later he became short of breath, sat up, took some deep inspirations and fell back with masseters in spasm and pulse imperceptible. In 30 seconds he was dead.

Autopsy.—Fibrosis from old infarction of myocardium of left and right ventricles. Old organised thrombosis in coronary arteries stenosed by atheroma. Ischæmic fibrosis of kidneys. No evidence of any recent infarct.

CASE 6.—Male; age 7 years; admitted Dec. 31, 1941. Diagnosis: nephritis type 2. For 6 months his mother had noticed he was getting fat, first round eyes and later round his ankles and abdomen. Seemed to pass plenty of urine which was not blood-stained. Was admitted to hospital in the country with middle-ear infections and treated with large quantities of fluid. His abdomen was tapped on two occasions. On admission, he was very pale, with gross pitting œdema of legs and lumbar pads; very puffy face; small discrete glands in axillæ; tongue dry. Chest, impaired percussion note and diminished breath sounds at both bases. Heart clear. BP 120/80 mm. Hg. Gross ascites with pitting œdema of abdominal wall and very œdematous scrotum. Urine: sp. gr. 1032; 2/3 vol. of albumin. Red cells 3,800,000 per c.mm.; Hb. 67% (Newcomer); white cells 10,927 per c.mm. Blood-urea 0·032%; non-protein nitrogen 0·044%. Plasma proteins 3·5% (albumin 2·34%, globulin 1·13%).

He was treated on fluids restricted to one pint daily and a salt-free high-protein diet. His urinary output varied between 15 and 20 oz. daily. On Sept. 7 he received an intravenous injection of 1 c.cm. of neptal diluted to 2 c.cm. with normal saline, following ammon. chlor. gr. 15 t.d.s. the day before. There was no reaction to this injection; the urinary output after it was 20 oz. On Jan. 9, 1943, he had a second intravenous injection of 2 c.cm. of neptal diluted to 2 c.cm. with normal saline. During the injection he complained of severe pains in the head and abdomen. He made feeble crying noises, lost consciousness and died.

Autopsy.—Slightly wasted boy. Considerable œdema of lower limbs, scrotum, penis, lower half of trunk and sides of upper half of trunk. Kidneys moderately enlarged (370 g.), capsules stripping easily from pale subcapsular surfaces showing fine-meshed reticulum of congestion; cortex deepened (0·7 cm. deep) with indistinct pattern and numerous congested vessels in pale white background; no visible lipoid or hæmorrhage. No hypertrophy of left ventricle. Slight œdema and congestion of lungs. Congestion of liver affecting whole of lobule except yellow periphery. Congestion of spleen and mucosa of stomach. Mucus in right middle ear. Pericardial effusion (2 oz.), pleural effusions (2 pints each) and ascites (4 pints).

Microscopical Findings.—(1) Kidneys: nephritis mitis. Most glomeruli normal; several show slight proliferative glomerulitis, two show focal proliferation of epithelial cells without crescent formation and two show periglomerular fibrosis. Albuminous degeneration of tubular epithelium, a few showing slightly enlarged nuclei or proliferation of cells; small foci of moderate tubular atrophy associated with infiltration with lymphocytes and a few plasma cells and very slight proliferation of fibroblasts; calcification of many scattered tubules; congestion. (2) Kidney (frozen section): scanty amount of lipoid in small granules in epithelial cells in many tubules, in intertubular tissue and focally in a very few glomeruli. (3) Liver: albuminous and dropsical degeneration of hepatic cells. (4) Myocardium: normal. (5) Spleen: congestion.

DISCUSSION

The cause of these deaths remains obscure. The *Lancet*, in an annotation (1942, ii, 651), attributes them to four possible causes: (1) unsuitable cases (e.g., patients with renal disease); (2) continued use of the drugs when they have already produced toxic effects; (3) excessive doses, for example 4 c.cm. intravenously; (4) use of the drugs in patients likely to die at any moment, so that there is no evidence that death was due to the diuretic. Only case 1 in the present series received a dose as large as 4 c.cm., but in case 6 the child of 7 years received 1 c.cm. on one day and another 2 c.cm. two days later, which may have been on the large side. Cause 4 has been excluded from the cases reviewed in this paper.

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The gross œdema which often persists in patients with type 2 nephritis may be relieved by the mercurial diuretics, and there is no evidence that their repeated use has any harmful effect on the kidneys. Many of these patients instead of staying in bed in a waterlogged state are enabled to remain comfortable, up and about, practically œdema free, by means of a weekly injection once the preliminary diuresis has been effected. The use of these drugs should be limited to this type of nephritis and even here is contra-indicated if there is no good diuretic response or if renal failure is present. The occurrence of a few unfortunate reactions is not an indication to withhold the drug but rather to use care in administering it.

Tyson (1941) was of the opinion that the injections were too small to bring about the "speed-shock" described by Hyman and Hirschfeld (1931), but Hyman (1942) thinks the occurrences are entirely in keeping with that condition and would expect the blood to be non-coagulable at autopsy. Tyson suggested that the reaction was in the nature of an anaphylactic reaction, and drew attention to the fact that patients with nephritis and greatly lowered plasma proteins were most liable to be affected.

Salant and Kleitman (1922) showed that ventricular fibrillation might follow the use of inorganic mercurial salts and mercurochrome. Chastain and Mackie (1940) demonstrated that it was possible to kill normal dogs with seven times the maximum human therapeutic dose of the mercurial diuretics, and such dogs showed changes in the T wave, the QRS complex and finally ventricular fibrillation. Barker, Lindberg and Thomas (1942) also showed that in dogs mercurial diuretics produced depression of the T wave, runs of extrasystoles, ventricular tachycardia and ventricular fibrillation. De Graff and Lehman (1942) expressed the view that death was caused by the action of these drugs on the heart; an early manifestation is a change in ventricular conduction while the terminal effect is either ventricular fibrillation or respiratory failure secondary to the cardiac action.

There is no evidence that these deaths are more likely to occur when drugs such as ammonium chloride, phenobarbitone or digitalis are given at the same time; nor that they are less likely if the drug is greatly diluted or injected extremely slowly. In case 2 the patient was having thyroid gr. 1 t.d.s., but there is nothing to show that this, or her myxœdema, was connected with her death.

Four out of the six cases reported here, and eight out of the fifteen published elsewhere, occurred in patients with nephritis type 2. Since there are many more patients with heart disease receiving treatment with mercurial diuretics than with nephritis it seems possible that this preponderance of immediate death in the nephritis group is significant. It may be connected with lowered plasma proteins or a disturbed albumin: globulin ratio of these patients.

None of the patients in this series died after the first injection, which makes acquired sensitivity a probable cause of the phenomenon. It is possible that these drugs function as haptens conjugated with a colloidal protein carrier. This may take place more easily in patients with a lowered plasma protein. In one of the cardiac patients in this series the plasma proteins were low, and he had received a transfusion of 250 c.cm. of double strength serum; the other cardiac patient did not have the plasma proteins estimated; three of the four nephritics had plasma proteins of less than 4·5%.

Many thousands of patients a year receive great benefit from treatment with mercurial diuretics, and yet, counting the present series, it is only possible to find 21 published cases of immediate death following their use in a period of eleven years. These cases are therefore clearly not an indication for discontinuing the use of these drugs. It may however be advisable to restrict their use in nephritis, and possibly also in cardiac cases with a low plasma protein, to the intramuscular route.

SUMMARY

Six deaths immediately following the intravenous injection of mercurial diuretics are reported from the hospitals of a London sector in a period of 6 years. Four cases had nephritis type 2 and two heart disease. In 11 years fifteen such deaths have been reported elsewhere: eight in patients with nephritis and seven with heart disease.

The cause is obscure. It may be an acquired sensitivity.

Thousands of patients each year derive great benefit from mercurial diuretics; these deaths are not an indication to discontinue their use. It may be advisable to give them intramuscularly to patients with a low plasma protein.

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VITAMIN-C INTAKES IN A SMALL SHIP

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IN a previous investigation[1] efforts were made to assess the vitamin-C intake of patients with sore and bleeding gums before their symptoms began. Estimates were based on two uncertain quantities. From dietary histories, even with the help of food models and investigation of victualling, we could gauge only approximately the amount of food eaten; and we did not know how much the vitamin-C content of these foods varied from published values or from the results of isolated tests. The present study aimed at obtaining more accurate information as to vitamin-C intake in small ships. For this purpose we weighed the foods actually consumed, and measured their vitamin-C content.

The ship chosen was a trawler-minesweeper with a complement of 21. Food for the whole ship's company was cooked in the one galley at the same time, half being sent forward to the seamen's mess-deck and the other half divided among 2 officers, 4 petty officers and 4 stokers. The 11 seamen were selected as subjects for detailed investigation, and weighing, &c. was carried out in their mess.

METHODS

Using an individual method (McCance, R. A. 1941, personal communication) food consumption was measured on half the days of a fortnight beginning Nov. 24, 1941. As it proved impossible to weigh food accurately while the ship was pitching, most of the weighed meals were those eaten in port. Spring balances to weigh 2 lb. by ¼ oz., as used by McCance, were employed. Weights were checked and recorded by a sick-berth attendant trained for the job. At dinner, for example, each rating took his own plate numbered and weighed beforehand and made hot, and served himself first to meat, then to potatoes and then to other vegetables in turn, returning the plate to the balance after each fresh addition. For second helpings the plate and its residues were weighed, and reweighed with each addition. Finally, each man returned his finished plate and any food residues were weighed one by one. From the figures thus obtained the amounts of food actually consumed were calculated. Tins containing milk, jams, sugar, &c. were weighed before and after meals as a check on individual weighings. As a further check, the stocks of food on the mess-deck and in the ship's stores were mustered at the beginning and end of the fortnight. Supplies taken aboard during this period were recorded by the coxswain and checked by us at the NAAFI and victualling store. The coxswain also recorded foods supplied to the seamen's mess-deck from the ship's

1. Ungley, C. C. and Horton, J. S. F. *Lancet*, 1943, i, 397.

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stores. In the galley, observations were made as to the methods of cooking, and the amounts of food cooked.

During the meal, samples were taken of foods likely to contain vitamin C. Aliquots were placed in tared bottles containing freshly prepared 10% metaphosphoric acid (or 2 g. of the solid to which 20 ml. distilled water could be added 15 minutes before sampling) and transported to the laboratory packed in carbon dioxide snow. The material was ground under 10% metaphosphoric acid, centrifuged and extracted again. The supernatant fluids were mixed and titrated against standardised solutions of 2:6 dichlorophenolindophenol (Mapson, L. W. 1941, personal communication).

Feeding and cooking arrangements, apart from the weighing and sampling, were unaltered and we refrained from suggestions which might have led the men to alter their selection of foods.

RESULTS

At sea the men drank tea or coffee between four-hour watches, but meals were sometimes hurried and irregular, especially in bad weather. During the period of investigation sea trips were few and short, most meals being eaten in port. Meal times were: breakfast 7.30–8 AM; coffee 10.30 AM; dinner 12 noon to 1 PM; tea 4 PM; supper ("high tea") 5–6 PM.

At breakfast canned tomatoes, served three times and in half quantities once during the fortnight, were the chief source of vitamin C. Consumed by 8 men, the average helping provided 11·4 mg. of ascorbic acid. An average helping of canned beans in tomato sauce provided only 1·2 mg. A man refusing neither beans nor tomatoes would have derived from 14 breakfasts an average of 3 mg. daily.

At dinner vegetables were the chief source of vitamin C. Ascorbic-acid values for boiled potatoes at dinner ranged from 1·6 to 7·4 mg., average 3·4 mg. per 100 g. Values for boiled potatoes at supper were 1·1 mg., 1·6 mg. and 1·8 mg. Steamed potatoes contained 8·6 mg. and 4·0 mg. per 100 g. Boiled potatoes fried for supper contained only a trace.

The average helping of potatoes at dinner ranged, in different individuals, from 6·6 to 14·1 ounces. On two occasions one man ate more than 20 oz. at a meal, but the average for 94 helpings was 10 oz., providing on the average 12 mg. of ascorbic acid. The corresponding figures for helpings of potatoes at supper were: range 3·6–8·8 oz., average for 41 helpings 6·7 oz., which provided an average of 3·5 mg. on 8 out of 14 days. Dried peas, as served, contained negligible amounts of vitamin C. Cabbage was taken by 10 out of the 11 men at 3 meals in 2 weeks in amounts varying from 3·8 to 10·1 oz. The average helping was 6 oz., providing 10·8 mg. of ascorbic acid. Sprouts were taken once only; the average helping was 2·5 oz., containing 21·5 mg. Swedes, served once, provided 12·5 mg. in an average helping of 4·7 oz. Soup, served four times, showed values of 0·5 mg., 2·1 mg. and 2·6 mg. per 100 g. of liquid portion and sometimes rather higher values for solid parts. The average helping was 11·7 oz. supplying 5·7 mg. of ascorbic acid. Canned milk and jams contributed an average of not more than 1 mg. of ascorbic acid per day.

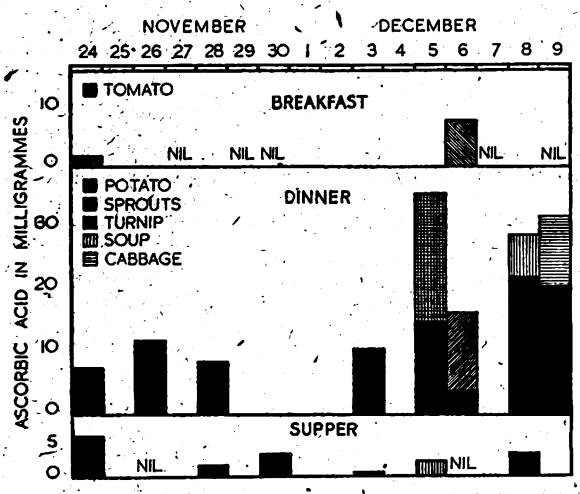

Fig. 1—Average intake of ascorbic acid per man at each weighed meal during the fortnight. During the first week of the survey when potatoes were the only fresh vegetables the average daily intake was 16 mg. In the second week the addition of greens, turnips, &c., and higher values obtained for potatoes, brought the average intake to more than 30 mg. a day.

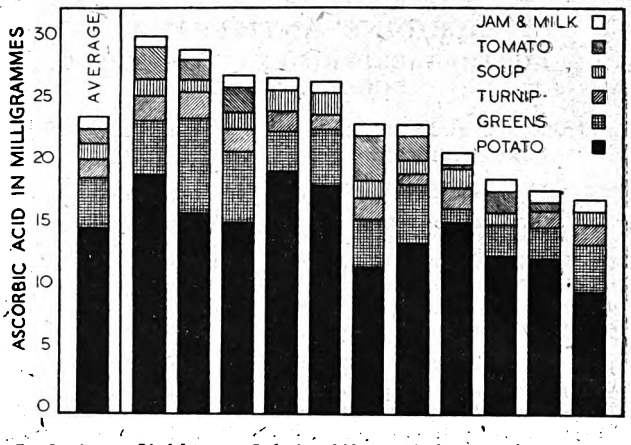

Fig. 2—Average daily vitamin-C intake of 11 seamen, showing relative amounts of ascorbic acid derived from various foodstuffs.

During the first week of the survey when potatoes were the only fresh vegetables, the average daily intake of ascorbic acid was 16 mg. In the second week the addition of greens, turnips, &c., and higher values obtained for potatoes (coinciding with the arrival of a more skilled cook and also with the starting of a fresh batch of potatoes), brought the average intake to more than 30 mg. a day (fig. 1). The total daily intake derived from the average of weighed breakfasts, dinners and suppers in the 11 men is given in fig. 2. To these totals must be added about 1·0 mg. per day for jam, marmalade and condensed milk. Individual intakes ranged from 17·2 to 30·5 with an average of 23·8 mg. Expressed per 10 st. body-weight the range was 15·1 to 27·7 mg. Average 22·6 mg. (0·35 mg. per kg.).

At the end of the survey, plasma ascorbic levels had been obtained from 4 men before the ship left suddenly and the experiment terminated. Although these values were low (0·1, 0·1, 0·2, 0·4 mg. per 100 ml. of plasma), they provided no evidence of scurvy or subscurvy. There were no scorbutic skin or gingival changes, and no other symptoms or signs suggestive of nutritional deficiency. The gums, examined in consultation with Surgeon Commander (D) H. P. Buchanan, RNVR, were either normal or only slightly subnormal. There was no evidence that the men were any the worse in health for the rather low intake of ascorbic acid.

SUMMARY

As a sequel to an inquiry into the causation of sore and bleeding gums in Naval personnel, the present investigation sought to obtain accurate information as to vitamin-C intake in small ships. Foods eaten by 11 seamen serving in a trawler-mine-sweeper were weighed by an individual method and their vitamin-C content measured.

The average daily intake of ascorbic acid was about 16 mg. in the first week and increased to 30 mg. in the second week. The average daily intake per 10 st. body-weight varied from 15·1 to 27·7 mg., the average for 11 men being 22·6 mg. (0·35 mg. per kg.)

The low intake in the first week was attributed chiefly to failure to obtain sufficient of the fresh vegetables which were available in the district.

Plasma ascorbic levels obtained at the end of the survey were low, but the ratings showed no clinical evidence of nutritional deficiency. The gums varied from normal to slightly subnormal and were never scorbutic.

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ACRIDINE ANTISEPTICS

FURTHER EXPERIMENTS ON THEIR LOCAL ACTION

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In view of the renewed interest in the acridine antiseptics (*British Medical Journal* 1943) we now record the histological effects upon the rabbit's brain of a new member of the acridine group, 5-aminoacridine hydrochloride. We also describe our observations of the effects of various acridine compounds in powder form.

5-AMINOACRIDINE HYDROCHLORIDE

This compound was prepared and tested by Albert, Rubbo, and Goldacre (1941) and by Rubbo, Albert, and Maxwell (1942) in the course of a systematic investigation into the antibacterial activities of the mono-aminoacridines. It is a potent bacteriostatic agent in high dilutions forming a pale yellow solution which does not stain fabrics. A 1:1000 solution in isotonic saline, buffered to pH 6·2, was applied to the brain in four rabbits using the same technique as in our earlier study (Russell and Falconer 1941). In brief this involved the removal of a triangular area of the skull, about 2 × 1·5 cm., over the cerebrum and the application for 10 minutes of an excess of the solution on saturated pledgets of lintine, after reflection of the dura and scarification of the exposed leptomeninges in three or four places. At the same time 0·1 c.cm. of the solution was injected into the cortex. The animals were killed after 1, 2, 4, and 8 days respectively.

For purposes of comparison, a similar solution of 2:7-diaminoacridine monohydrochloride was used in two additional rabbits. These were killed after 2 and 4 days respectively. The six animals appeared healthy and active during the period of survival.

Macroscopic results.—Apart from trivial focal subdural and subarachnoid hæmorrhage in one animal, the surfaces of the brain appeared normal in the four animals treated with 5-aminoacridine. There was slightly more meningeal hæmorrhage in the two rabbits treated with 2:7-diaminoacridine. On section the cortex appeared normal in all six animals. The site of injection was identified in three of these (two treated with the 5-compound and one with the 2:7-compound) as a linear or pin-point hæmorrhage.

Microscopic results.—The appearances were similar in both groups. At early stages (1 to 2 days after operation) there was slight diffuse hæmorrhage and polymorphonuclear infiltration in the leptomeninges. The underlying cortex showed occasional small marginal hæmorrhages, probably corresponding to points of scarification. Both in the early and later stages the neurones of the superficial cortical laminæ were frequently shrunken and hyperchromatic. Fibroblastic proliferation was in progress in the meninges by the 4th day and was conspicuous at the 8th day. The site of puncture was identified in the cortex in all but one animal (that treated with the 2:7-compound and killed on the 4th day): there was a trivial amount of necrosis and hæmorrhage in the adjacent tissue on the 1st and 2nd days after operation; by the 4th and 8th days this was occupied by a small group of active microglial cells and proliferating capillaries. The surrounding tissues appeared normal.

Comment.—In our earlier observations on the acridine antiseptics (1941) a curious dissimilarity was noted in the histological effects in vivo of different members of the group. Acriflavine and euflavine were uniformly damaging in a high degree, whereas proflavine and 2:7-diaminoacridine, on the contrary, appeared hardly more harmful than isotonic saline at pH 6·2. 2:7-diaminoacridine was perhaps rather more prone to excite hæmorrhage than was proflavine, but our experiments with this compound were too few to permit a definite statement on this point. In the present experiments we have again formed the impression that hæmorrhage is more readily excited by 2:7-diaminoacridine than by proflavine or 5-aminoacridine, but this impression was based on macroscopic rather than on microscopic observations.

The histological results with both compounds were highly satisfactory. We do not consider that they surpassed those previously obtained with proflavine; but, within the limits imposed by our technique, it is not easy to see how any improvement upon proflavine could be registered. Should other tests, such as those devised by Manifold (1941), demonstrate the superiority of one or other of these compounds a reason would thereby be found for their clinical use in preference to proflavine.

POWDERED ACRIDINE COMPOUNDS

Mitchell and Buttle (1942) have reported good results in the treatment of infected gunshot wounds in various parts of the body by the instillation of powdered proflavine. They have also suggested that small doses (0·25 gramme or less) might effectively be used in prophylaxis. We have therefore made a few experiments with proflavine, 2:7-diaminoacridine, and 5:aminoacridine.

The technique was the same as that used for powdered sulphanilamide and sulphapyridine (Russell and Falconer 1940). Sufficient powder was sprinkled upon the exposed leptomeninges to form a thin layer. It was estimated that the amount used was from 0·02 to 0·05 g. (equivalent to 0·7 to 1·7 g. for man). The powder immediately formed a soft paste which flowed over the adjacent bone and muscle as it became diluted with the body fluids. Two animals were used for each of the three compounds; they were killed after 2 and 4 days respectively. In contrast to the animals treated with the solutions these rabbits did not thrive after operation; they all appeared listless, displayed little interest in their food, and were irritable when handled. In two animals (one treated with proflavine and one with the 2:7-compound) there were convulsive attacks on the days following operation.

Macroscopic results.—The superficial appearances were similar in all. Beneath the scalp was a considerable effusion of blood-stained fluid mixed with clot which sometimes obscured the operative opening in the skull. There was diffuse hæmolytic staining of the deep aspect of the scalp and of all other soft tissues that had been in contact with the compound. The exposed area of brain was swollen and brown or reddish-brown. On section the subjacent cortex was soft and swollen, but showed no further change where proflavine had been used; with 2:7 diaminoacridine there was an uneven superficial zone of hæmorrhage and with 5:aminoacridine brownish-red necrosis extended as a broad wedge throughout the exposed area of brain as far as the lateral ventricle.

Microscopic results.—In all instances complete necrosis with variable degrees of hæmorrhage and leucocytic infiltration prevailed wherever the tissues had been exposed to these compounds. Thus muscle and scalp as well as the brain and its meninges were affected. With proflavine the necrosis of the brain was anæmic and extended as an uneven zone up to 2 mm. deep throughout the operation area. With 2:7-diaminoacridine and 5-aminoacridine the necrosis was of a more hæmorrhagic character. In the latter the necrosis extended to the wall of the ventricle—a depth of 6 mm.—and the choroid plexuses in both lateral ventricles were œdematous, their stroma being sparsely infiltrated with polymorphonuclear leucocytes. The ventricles contained a few red corpuscles, leucocytes, and macrophages. In the muscle bordering the bony opening a similar necrosis was found in all six animals, but was limited to a superficial zone about 2 mm. deep.

Comment.—The local effect of each of the three powders used was so devastating to the tissues that no further trials appeared necessary. It might be thought, however, that a mixture of the powder with buffering salts, such as the 'Isoflav' powder prepared by Boots Pure Drug Co. for the preparation of isotonic buffered solutions, could be used with greater impunity.

We therefore repeated our experiments upon four rabbits using isoflav powder. On recovering from the operation two of the animals appeared ill and the other two were somewhat torpid. When killed after 1, 2, 4, and 8 days respectively the macroscopic appearances at the site of operation were similar to those following the use of the pure powders. On section, hæmorrhagic

* Working for the Medical Research Council.

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necrosis descended as a broad wedge to the wall of the ventricle. Microscopic examination confirmed the naked-eye appearances. In the two animals that had appeared ill after operation there was slight intraventricular hæmorrhage. Again there was hæmorrhagic necrosis of the muscle bordering the decompression but, as before, it was confined to a superficial zone about 2 mm. deep.

It is clear therefore that when the solid is applied to the tissues the addition of buffering salts to proflavine does not diminish the noxious effects. And indeed the salts themselves, when applied alone in the proportions used for isoflav powder, are as damaging as pure proflavine powder. We demonstrated this in two animals in which we used, in the same manner as before, a mixture of alkaline sodium phosphate and sodium chloride in accordance with the formula kindly provided by Boots Pure Drug Co. The results, macroscopically and microscopically, were indistinguishable from those obtained with isoflav; hæmorrhage and necrosis extended through the cortex and white matter to the wall of the lateral ventricle.

DISCUSSION

We do not propose to reiterate the advantages of using selected members of the acridine group in the prophylactic treatment of wounds. They have been considered in our earlier paper (1941) and more recently by Browning (1943). The superiority of proflavine to the sulphonamides in defending the tissues against *Cl. welchii* has been demonstrated experimentally by McIntosh and Selbie (1942).

Both our early and our recent experiments show that 1:1000 solutions of at least three members of the acridine group—namely, proflavine, 2:7-diaminoacridine, and 5-aminoacridine—are suitable for the prophylactic treatment of wounds, in view of their negligible damaging action upon the tissues. From our observations there seems to be little to choose between them. We retain our preference for proflavine, since buffered isotonic solutions of this compound have proved consistently satisfactory in head operations performed in this clinic. In the dilution used (1:1000) the solution is bacteriostatic without causing destruction to the tissues. We are aware that such solutions have been found damaging to fibroblasts in tissue culture (Jacoby, Medawar, and Willmer 1941). But as Bourne (1942) points out, "the tissue culture cell is in a different metabolic state from that of the same type of cell in organised tissue." If therefore the reactions of cells in tissue culture appear different from those in the living animal, as they do in this instance, it seems wiser to be guided by the latter.

From the experiments described above we cannot recommend the acridine antiseptics as pure powders for the prophylactic treatment of wounds. Not only the brain, but also muscle and connective tissue undergo necrosis when left in contact with any of the three solids tested. Such necrosis, though limited to a depth of from 2 to 6 mm., might well entail considerable functional impairment. Moreover the presence of necrotic tissue may favour secondary infections by anaerobes. The treatment of suppurating wounds with proflavine powder, which has yielded splendid results at the hands of Mitchell and Buttle (1942) in the Middle East, probably constitutes a different problem. An interval of 5–12 days had elapsed before the wounded reached them and "most of the cases were more or less heavily infected when first seen." In many cases previous sulphonamide therapy and other forms of treatment had failed to check the infection, and improvement did not occur until proflavine was applied. In all but 5 or 6 out of a series of 80 cases an improvement, which sometimes was dramatic, followed the instillation of up to 2 g. of proflavine powder. In infected wounds of this kind it may be that the acridine penetrates no further than the reactive barrier set up in the adjacent tissues, but in the meantime destroys everything else within range, including the bacteria.

Mitchell and Buttle also mention the prophylactic use of smaller amounts of proflavine powder (about 0·25 g.) mixed with 2 to 5 g. of powdered sulphanilamide in heavily contaminated bone wounds. None developed infection and there was no evidence of delayed healing. From this it appears that proflavine powder may be used beneficially in fresh wounds if heavily diluted with a compound such as sulphanilamide, which is known to be harmless in its action upon the tissues as well as being a bacteriostatic agent. But until it is known in what proportions the mixture may safely be applied, it would be preferable to restrict the use of proflavine and its allies to irrigating solutions of the strength and composition sanctioned by experimental and clinical tests.

SUMMARY

1. 5-aminoacridine hydrochloride causes no appreciable damage to the brain when applied in a concentration of 1:1000 in buffered isotonic saline at pH 6·2. In its action upon the tissues it closely resembles proflavine sulphate and 2:7-diaminoacridine.

2. When applied in the form of powder, all three compounds are highly destructive, not only to the brain but also to muscle and other soft tissues.

3. Whatever the merits of these powders in the treatment of suppurating wounds, their use in undiluted form in the prophylactic treatment of fresh wounds is inadvisable.

Our thanks are due to Glaxo Laboratories for samples of the acridine antiseptics used in this work and to Boots Pure Drug Co. Ltd. for samples of isoflav and its formula. The expenses of the work were defrayed by a special grant from the Medical Research Council.

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PNEUMOCOCCAL MENINGITIS

RECOVERY AFTER SULPHAPYRIDINE AND SERUM THERAPY

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PNEUMOCOCCAL meningitis is commonly secondary to otitis media or pneumonia and chiefly affects the elderly and the very young. The infection may be due to a pneumococcus of any type, but type 3 is the commonest. The value of sulphapyridine and sulphathiazole therapy is now accepted for all types and of sulphanilamide in type 3 infections. What was previously an almost invariably fatal disease is now curable in a proportion of cases. The mortality-rate of cases treated by chemotherapy is, however, uncertain, but is probably still high. There is said to be no conclusive evidence that adjuvant serum treatment contributes to recovery.[1] The following case is reported as a recovery after combined sulphapyridine and serum therapy.

An airman, aged 34, first presented with severe furunculosis of the left ear, which on resolution revealed an underlying otitis media with a moderate-sized posterior perforation. Subsequent increase of discharge and onset of pain and mastoid tenderness indicated mastoid spread. A cortical mastoidectomy was performed on Jan. 12, 1942, by one of us (H. A. T.) Pus under tension was released and the air cells were widely exenterated exposing the lateral sinus and the dura of the middle fossa, both of which were healthy. In removing the bridge of bone between the middle and posterior fossæ a flow of cerebrospinal fluid occurred. While the exact source of the flow could not be established, it was assumed that the dura of the middle fossa had suffered a small puncture wound. Sharp hæmorrhage from the emissary opening into the lateral sinus was controlled with a small pack and the wound only partially sutured. There were no subsequent signs of labyrinthine irritation to indicate the possibility of injury to that organ and the flow of CSF ceased in 24 hours. The first complete dressing was done under 'Pentothal' anæsthesia on Jan. 15; there was no hæmor-

1. *Lancet*, 1941, **ii**, 570.

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rhage, the mastoid cavity was clean and there was no discharge from the meatus. The local and general conditions were considered satisfactory, but in the early hours of the morning of Jan. 16 the patient began to vomit and complained of frontal headache. He soon developed signs of a severe meningitis, rapidly becoming comatose and very irritable, with marked neck and spinal rigidity.

The medical treatment and pathological investigations were subsequently undertaken by two of us (R. J. T. and C. P. W. respectively). Lumbar puncture on Jan. 16 showed a frankly turbid CSF, under pressure, in which pneumococci were identified in films and on culture. Sulphapyridine therapy was started forthwith, and in the course of nine days 60 g. was given, intramuscularly for the first three days and subsequently by mouth. Frequent vomiting at first made parenteral administration of the drug essential. Lumbar puncture was performed daily for the first six days to relieve pressure and as a check on clinical progress. 72 hours after the onset of this fulminating meningitis the patient's condition showed little if any improvement and prognosis appeared very poor. He had then had 28 g. of sulphapyridine, but the concentration of the drug in the blood and CSF was not assessed owing to lack of laboratory facilities.

The pneumococcus had been identified as type 3 and type-specific refined and concentrated antiserum (Lederle) obtained. At 1 AM on Jan. 19 a preliminary corneal sensitivity test was made and 100,000 units of serum were injected intravenously in divided doses in the course of the next 10 hours. By the end of this period he showed striking clinical improvement. He had become much less comatose and was able to articulate a few words and endeavour to coöperate. The pulse-rate dropped from 135 per min. at 2 AM to 85 at 10 AM. A further 100,000 units of serum were injected throughout the day on Jan. 20 and CSF obtained that day showed pneumococci in films but was sterile on culture. The rapid improvement which followed the injection of the first 100,000 units of serum may have been coincidental but was so dramatic as strongly to suggest that serum treatment had turned the scales for an apparently moribund patient. Steady improvement continued from then onwards. By Jan. 21 he was perfectly rational, though very weak and lethargic and still showing considerable neck and spinal rigidity; the latter was slow in resolving and slight stiffness was still present on Feb. 2.

On Jan. 25 he complained of pain in the right buttock and calf. Subsequently signs of a right sciatic neuritis developed, with wasting and weakness of anterior and posterior muscle-groups of the right leg, foot-drop, absent ankle-jerk and an area of hypo-algesia over the lateral aspect of the right leg. Treatment by rest and physiotherapy was required over a long period for this neuritis which may have been toxic in origin or the result of intramuscular injections of sulphapyridine into the buttock of a comatose patient. Five weeks after operation the mastoidectomy wound had progressed to complete healing with a linear scar. The tympanic membrane had also healed but a high degree of middle-ear deafness persisted. The sciatic neuritis slowly recovered but by April 4 there was still very little power of dorsiflexion at the right ankle and the tibialis anticus showed the reaction of degeneration. A foot-drop appliance was accordingly fitted, and the patient was soon able to walk with almost normal gait. On June 10 he returned to limited duty.

From then till July 17 he remained well. On this date he had a sudden focal epileptic attack in his right arm, and in the course of the next day or so a pronounced right hemiparesis and motor aphasia developed. A week later he was admitted to a military neurosurgical centre where a diagnosis of thrombophlebitis of the cerebral veins in the left fronto-parietal region was made. This clinical diagnosis was strengthened by the progress of the case and by the evidence of a cisternal encephalogram on Aug. 8. This showed a slight generalised dilatation of the left ventricle, indicating a mild degree of atrophy of the left cerebral hemisphere. Nothing was found to suggest a cerebral abscess. By the beginning of September the right hemiparesis had completely cleared up and by November his dysphasia had resolved, apart from a slight hesitancy of speech when excited. The old foot-drop showed little change. The cerebral thrombophlebitis was assumed to be related to the original pneumococcal meningeal infection, but the time interval between the two episodes was unusually long. He was invalided from the Service and returned home to seek his old employment.

We are indebted to Group Captain T. J. Thomas for permission to record this case, to Major M. A. Falconer, FRCS, for his notes covering the period at a military neurosurgical centre, and to Dr. Nancy Rodgers for bacteriological assistance.

STREPTOCOCCAL INFECTION OF MUSCLE

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As has often been observed, the diagnosis of gas gangrene is essentially a clinical problem. The anaerobic spore-bearing bacilli, including the few pathogenic varieties, are so widely distributed in soil and sand, in dust and in the intestines of many animals, that their mere presence in a wound is not in itself of much significance. Recognition of this has led comparatively recently to the differentiation of true gas gangrene and "anaerobic cellulitis"—which is an infection with spore-bearing gas-forming anaerobes, not of muscle but of connective tissue. True gas gangrene arises when muscle becomes infected with pathogenic anaerobes, and it is customary to diagnose it by the appearance and reaction of the tissue involved. It is the purpose of this paper to show that streptococci are also capable of infecting muscle, and of producing a condition liable to be mistaken for gas gangrene.

CLINICAL AND BACTERIOLOGICAL FINDINGS

In an investigation of the anaerobic infections of war wounds in the Middle East cases have been seen in which, in the absence of clostridia, there has been a massive infection of muscle, together with discoloration, œdema, serous exudate, gas-formation, local pain and generalised toxæmia. Neglected cases may progress to a true gangrene of muscle. In every instance the infecting agent has been *Streptococcus pyogenes* (Lancefield group A) in association with a limited variety of other organisms. It is not known how common such infections are; in the Middle East only 8 have been seen, although 3 others were strongly suspected. This is a small number compared with the total casualties or even with the gas gangrene figures, but there is reason to believe that some similar infections have been wrongly diagnosed as gas gangrene. It should also be pointed out that these 8 cases developed in six different hospitals, and were under the care of seven different surgeons. Had it not been for the central investigation on wound infections it seems improbable that the condition would have been recognised as a clinical entity.

Clinical picture.—It is outside the scope of the present paper to give detailed clinical histories and findings—indeed with so small a series it would be foolish to generalise—but the more important features are set out in table I.

Bacteriology.—In no case were spore-bearing bacilli found (table II). So far as it was possible to carry out detailed investigations the hæmolytic streptococci seemed in every way typical strains of Lancefield's group A.

They did not produce gas in carbohydrate media, and failed to ferment mannitol, sorbitol, or inulin (trehalose was not available). Unfortunately there were no facilities for typing these strains.

The four strains of anaerobic streptococci were all similar in type. They were small gram-positive cocci (smaller, that is, than *Strep. pyogenes*) and occurred in fairly long chains. Involution forms were not seen. They were strictly anaerobic, and did not tend to become micro-aerophilic or aerobic on subculture, as some varieties of anaerobic cocci do. Growth was not sustained on ordinary agar. On blood agar they formed small discrete round colonies which became opaque on exposure to the air. They were not hæmolytic. In meat broth they produced foul-smelling gas and hydrogen sulphide.

In carbohydrate media the reactions of the four strains were rather varied. Two (from cases 1 and 7) produced

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TABLE I—CLINICAL FINDINGS IN 8 CASES

Data	Case 1	2	3	4	5	6	7	8
Date of wounding	Nov. 26, 1941	Nov. 30, 1941	Dec. 3, 1941	Feb. 28, 1942	May 4, 1942	May 27, 1942	June 28, 1942	July 18, 1942
Onset of symptoms	Nov. 28	Dec. 4	Dec. 6	Mar. 2	May 5	June 3	July 6	July 22
Site of wound ..	L. leg	L. leg	L. arm	R. shoulder	R. thigh	L. arm	R. shoulder	R. arm
Condition of wound	?	Foul	Foul	Foul	Fairly clean	Foul	Fairly clean	Fairly clean
Smell	Slight	Slight	Foul	Slight	Slight	Slight	Nil	Slight
Exudate ..	Serous	Seropus	Serous	Seropus	Scanty, serous	Seropus	Seropus	Seropus
Skin—								
Colour ..	Red	Copper	Copper	Dark red	Copper	Red	Copper	Copper
Œdema ..	+++	++	+	+++	+	±	+++	++
Gangrene ..	Nil	Nil	Trace	Nil	Nil	Nil	Trace	Nil
Bullæ ..	Nil	Nil	?	Nil	Nil	Nil	Yes	Nil
Muscle—								
Colour ..	Red	Red	Dark red	Red	Rather pale	Red	Dark red	Red
Œdema ..	++	++	+	±	+	+	+++	+
Gas	Present	Trace	Present	Present	Present	Present	Trace	Present
Crepitation ..	+	±	+	++	−	+++	±	++
Pain	Severe	Moderate	Severe	Almost nil	Moderate	Severe	Very severe	Slight
Toxæmia ..	Moderate	Severe	Moderate	Severe	Severe	Severe	Moderate	Moderate
Outcome ..	Recovery	Recovery	Recovery	Recovery	Death	Recovery	Recovery	Recovery

acid and gas in glucose, maltose, lævulose and salicin. They failed to ferment lactose, galactose, arabinose, sucrose, rhamnose, mannitol, dulcitol, sorbitol or inulin. One strain (from case 2) produced acid and gas in glucose, maltose and lævulose only. The strain from case 5 fermented glucose, maltose, lævulose, galactose and salicin with the and lævulose only. The strain from case 5 fermented production of acid and gas.

All strains were indole-negative. No other biochemical activities were tested for.

Precipitin tests were carried out by the Lancefield technique, using antisera prepared four years before against eight different strains of anaerobic streptococci isolated from a wide variety of sources.

The strain from case 1 gave a well-marked reaction with antiserum PG 7. The strain PG 7 (now it is feared lost) had originated from a fatal case of puerperal sepsis, and was the commonest type of anaerobic streptococcus identified in a series of investigations carried out immediately before the war, and as yet unpublished. The other three strains failed to react with any of the antisera. None of the four anaerobic streptococci gave any reaction with sera prepared against hæmolytic streptococci of groups A, B, C and G. None was pathogenic to animals (mice, guineapigs or rabbits).

These four strains fall into the group A of Prévot (1925) and of Colebrook and Hare (1933). It should be added that in a recent extensive investigation Stone (1940) failed to find any criterion suitable for the classification of the anaerobic streptococci. Admittedly the various groups created by Prévot and by Colebrook and Hare are artificial and exhibit in their individual members wide differences both in biochemical activity and antigenic structure; yet the groups themselves are reasonably well-defined, and until a more rational system of taxonomy appears it would be well to retain them.

The other organisms isolated from these cases were in no way unusual, and require no further comment.

DIFFERENTIAL DIAGNOSIS

In spite of the superficial similarity to gas gangrene the recognition of this condition has on the whole been fairly simple. The chief points of differentiation are:—

1. The cutaneous erythema is much more pronounced and extensive than in true gas gangrene. In the streptococcal type of infection the discoloration of the skin has always been more extensive than that of the underlying muscle; in gas gangrene the reverse is true, except in very advanced or fulminating cases, or those with multiple wounds.

2. The discoloured muscle in the condition under review is still alive and will react to stimuli, and though swollen and œdematous and of an unhealthy coppery colour, has not the boiled and coagulated appearance of muscle in gas gangrene.

3. The smell is quite different—neither so pungent nor so sweet as in anaerobic infections.

4. By far the most striking feature is the appearance under the microscope of a muscle-smear stained by Gram's method. No gram-positive bacilli are to be seen, but in their place vast numbers of streptococci are found among masses of pus cells. In most cases such direct smears showed what appeared to be a pure infection with streptococci; it was only by cultural methods that the presence of other organisms was revealed.

5. It will be obvious that if non-pathogenic clostridia were present, or even aerobic spore-bearers and members of the proteus group, the immediate diagnosis would become extremely difficult if not impossible, since streptococci are quite often to be found in cases of gas gangrene. Very large numbers of streptococci in the direct smear associated with extensive cutaneous erythema and living muscle would be suggestive features, but certainly no more.

TABLE II—ORGANISMS FOUND IN 8 CASES

Organism	Cases							
	1	2	3	4	5	6	7	8
Strep. pyogenes ..	+	+	+	+	+	+	+	+
Strep. viridans ..	−	−	+	−	−	−	−	−
Anaerobic strep.	+	+	−	−	+	−	+	−
Staph. pyogenes	−	−	+	+	+	−	+	−
Staph. albus ..	−	+	−	+	−	−	−	+
Bact. coli ..	+	−	−	−	−	−	−	+
Proteus vulgaris..	+	−	−	+	−	−	−	−
Diphtheroids ..	−	−	+	+	−	−	−	−

TREATMENT

Results have been clear-cut. Cases 1, 2, 3, 6, 7 and 8 recovered with the minimum of surgical intervention and large doses of sulphonamides, both locally and by mouth. The actual sulphonamide compound used varied considerably from case to case, and did not appear to be of much importance. In 2 cases an incorrect diagnosis of gas gangrene was made, and much more radical treatment was carried out in consequence.

CASE 4.—The arm was amputated; after a stormy three days the patient gradually recovered through a long convalescence. This man was receiving large doses of sulphapyridine both before and for 10 days after operation.

CASE 5 died, 18 hours after amputation at the thigh, from a fulminating hæmolytic streptococcal septicæmia. In his

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case anaerobic streptococci were recovered from the heart's blood at autopsy; these were of the same type as those isolated from the muscle before death. The patient had received no drugs of the sulphonamide group until after operation.

It is convenient to mention here that at least one and probably two of the three suspected cases (not listed in the tables) died from hæmolytic streptococcal septicæmia following extensive operations.

These findings justify a preliminary report such as this. In infections of the type described the importance of intensive chemotherapy and extremely conservative surgical treatment cannot be over-emphasised. In the 6 cases correctly diagnosed surgical intervention was limited to skin incisions and exposure of the affected muscle or muscles; and drugs of the sulphonamide series were given in massive doses locally and by mouth. Results were highly satisfactory.

DISCUSSION

The presence of anaerobic streptococci in 4 out of the 8 cases deserves comment. These organisms have not been commonly found in war wounds in the Middle East, but they are difficult to isolate and tend to die out rapidly in culture, and so may have been missed in some cases. When they have been suspected and specifically sought it has usually been possible to recover them in pure culture. Such organisms have been isolated from a wide variety of lesions (Sandusky et al. 1942), notably foul and chronic ones; and in recent years, owing to the great effectiveness of the sulphonamide drugs against hæmolytic streptococci, their relative clinical importance has greatly increased.

Anaerobic streptococci were quite often found in the gunshot wounds of the last war (Cottet 1918, Douglas, Fleming and Colebrook 1920) but have not been so common in the present war, at any rate in the Middle East. Three cases of gas gangrene have been described in which anaerobic streptococci were believed to be the causal organisms (Silberschmidt 1902, Marwedel and Wehrsig 1915) but by present-day criteria the diagnosis of each of these cases would be suspect. Lyons and Owen (1942) speak of cases of "gas gangrene due to non-haemolytic anaerobic streptococci with clinical toxæmia," but fail to give any details. No true case of gas gangrene due to these organisms has yet been seen in the Middle East, although about 8% of gas gangrene cases have had anaerobic streptococci as part of the anaerobic flora of their wounds. There can be little doubt that in cases 2, 5 and 7 of the present series the gas produced originated from these organisms; whether they play any other rôle is as yet uncertain. The anaerobic streptococci are notoriously resistant to drugs of the sulphonamide series, and because of this it might be argued that they cannot be of much ætiological importance in streptococcal infections of muscle. This, however, is not necessarily so. Cullen (1924), Brewer and Meleney (1926), Meleney (1929, 1933) and since then many others, have described a spreading gangrene of skin, due not to a single organism but to a hæmolytic strain of *Staph. aureus* and an anaerobic streptococcus acting in symbiosis. Neither of these organisms could produce this definite clinical condition by itself, only when in company with the other. It is possible that some similar partnership exists between *Strep. pyogenes* and the anaerobic streptococcus. I do not for a moment think that the condition under review is in any way related to the "postoperative synergistic gangrene" of Meleney, for there are innumerable points of difference; but more information on the presence of anaerobic streptococci in such infections of muscle is desirable.

That aerobic streptococci could cause gangrenous lesions has been known since the early experiments of Koch (1878); yet from a clinical point of view little attention was paid to such conditions until Meleney (1924, 1929, 1933) clearly defined a hæmolytic streptococcal gangrene and summarised much of the earlier literature. This condition is essentially a skin infection, perhaps best described by Pfanner (1918) as "nekrosierenden Erysipels." The underlying muscles are not involved, and in some of Meleney's illustrations stand out as if in an anatomical dissection. Clearly this is a different type of infection. Yet the two conditions have much in common, and appear to stand in much the same relationship as anaerobic cellulitis does to gas gangrene.

In the Middle East the comparative uselessness of the sulphonamides in the treatment of established cases of gas gangrene has been striking. Yet several papers have appeared claiming that these drugs have been of great service in such infections (Sandusky and Manahan 1939 Baker 1939, Love 1940). It is possible that some of these cases have been streptococcal infection of muscle in which anaerobic bacilli have been present as saprophytes rather than as true invaders. Indeed the whole interrelationship of the condition described and gas gangrene, hæmolytic streptococcal gangrene and anaerobic cellulitis is obviously worth more detailed investigation, both from clinical and experimental points of view. It seems improbable that there will be any clear-cut demarcation between the various types of infection; one variety or combination of varieties may fade imperceptibly into another.

SUMMARY

A streptococcal infection of muscle simulating gas gangrene is described.

The best results were obtained with sulphonamide therapy and the minimum of surgical intervention.

It is a pleasure to thank many surgeons and pathologists in the Middle East for clinical and laboratory facilities and material, and Colonel J. S. K. Boyd for advice and encouragement.

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SPONTANEOUS RUPTURE OF THE SPLEEN IN MALIGNANT TERTIAN MALARIA

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INJURY to the normal or pathologically enlarged spleen is not uncommon, especially in the tropics, and is of considerable surgical and mediolegal interest. The following case we consider is worthy of record on account of the circumstances associated with it.

CASE-HISTORY

A young man, aged 21, was admitted to hospital at 7 AM on June 1, 1941, having travelled the previous night from Trincomalee to Colombo, a distance of over 180 miles. He had had an attack of malaria a month before admission which had been treated with quinine until the acute symptoms had subsided, and this had been followed up with short, intermittent courses of quinine. For the 48 hours preceding admission he had been feeling unwell with headache, backache and a slight cough, and he had had one rigor.

On admission he had a temperature of 100° F.; pulse-rate 86 per minute. His general condition was good, skin dark, mucous membranes healthy, no evidence of jaundice, heart and lungs normal, abdomen relaxed, spleen not palpable, urine clear. His blood showed a moderately heavy infection with malignant tertian malarial parasites. He was put to bed on a light diet and with a mixture of quinine containing quinine hydrochloride, gr. 7 to the ounce; 1 oz. was given three times a day. By 6 PM that evening his temperature had risen to 103° F. On the following day he was seen by one of us (R. T.) at 11 AM. His condition was satisfactory; he felt much better, his abdomen was relaxed and there was no tenderness or guarding. At 12.15 PM he vomited a dose of quinine with a quantity of bile-stained fluid. At 3.30 PM he was not feeling very well. He had partial incontinence of

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fæces and was given a bedpan. At 3.45 PM while on the bedpan he had a severe attack of vomiting and retching and had to be steadied by the attendant. At 5 PM he complained of abdominal discomfort, not amounting to pain, and passed several stools; immediately afterwards he was cold and sweated profusely. At 5.15 PM he was seen by the medical officer on duty and was found to be collapsed, pulseless, cyanosed and semiconscious. His abdomen was relaxed and he complained of no pain or discomfort. He was given 1·7 c.cm. of nikethamide intravenously and the routine treatment for shock, and his condition responded a little; but at 6.30 PM he again collapsed with restlessness and air hunger, the whole condition suggesting a major hæmorrhage. His condition did not warrant any form of operative treatment and he was given a further injection of nikethamide but he died at 6.50 PM.

At autopsy, about 16 hours after death, the body was that of a well-nourished male aged about 21. The meninges showed congestion but the brain substance seemed normal. The peritoneal cavity contained about 2 pints of fluid and clotted blood, the clot being chiefly over the spleen and coils of intestine in the left half of the abdomen. The liver weighed 59 oz. and was large, greyish brown, and soft; capsule not thickened; no evident fibrosis. Spleen (15¼ oz.) was large and purplish red; the capsule was very thin and showed a tear 2 in. long over the upper part of the outer surface. A large subcapsular blood clot extended over the whole external surface. The splenic substance showed complete loss of architecture and was extremely soft. On microscopic examination the liver showed slight round-cell infiltration of the portal tracts; cloudy swelling of liver cells and localised fatty change. The Kupffer cells and the red cells in the sinusoids contained malignant tertian malarial parasites and pigment. In the pancreas the blood-vessels showed malarial parasites and there were localised areas of necrosis. The brain vessels were much congested and showed malarial parasites. The kidneys showed cloudy swelling and congestion; many parasites in the vessels. There was much congestion of the splenic pulp with endothelial proliferation but no fibrosis. The Malpighian bodies seemed normal. There were numerous parasites and much pigment present.

DISCUSSION

Stillman and Pool[1] refer to cases of spontaneous rupture of the spleen in malaria, typhoid, puerperal infection, pregnancy, relapsing fever, typhus and tuberculosis, and draw attention to observations made by Conner and Downs of the two distinct groups into which symptoms of rupture of the spleen fall: (1) local symptoms of rupture and of irritation of the neighbouring peritoneum by the extravasated blood; and (2) general symptoms of severe internal hæmorrhage. The earliest symptom seems to be pain. In one case a sudden stabbing pain in the hypochondrium was soon followed by vomiting and signs of collapse; 3 days later this patient seemed to improve but on the 4th day he was seized with similar symptoms and operation revealed a rupture of the spleen; after its removal the patient made an uninterrupted recovery. He was suffering from typhoid and there was no history of trauma. The initial symptoms appeared spontaneously; lamination of the clot in the neighbourhood of the spleen confirmed that rupture had been spontaneous.

Cases of slight trauma rupturing the pathologically enlarged spleen are not rare and a case was reported by Ghey[2] where a man fell over a hurdle while standing on the bottom rail. The blow was so slight that he did not pause in his work and was apparently in the best of health doing manual work until 4 days later when he was seized with severe abdominal pain while in bed. He sweated and retched but did not vomit. At operation the spleen was very much enlarged and slightly adherent, with a subcapsular hæmatoma and a rupture at the lower pole. It was only after close questioning that the man recalled the original slight injury. It is thus difficult to exclude slight trauma when a rupture of the spleen is claimed to be spontaneous. In the case of our patient there was no such history. He was under constant medical supervision, and the symptom of abdominal discomfort was the only symptom indicating the abdominal catastrophe until the onset of the terminal signs of a major hæmorrhage. At autopsy the splenic pulp was that typically associated with acute malignant tertian malaria and the clot under the capsule and in the immediate neighbourhood was not laminated but of recent origin.

1. Pool, E. H. and Stillman, R. *Surg. Clin. N. Amer.* 1925, 5, 313.
2. Ghey, P. H. R. *Lancet*, 1937, ii, 628.

SUMMARY

We consider the case of interest in view of three points: the lack of localising signs usually present in cases of subcapsular hæmorrhage; the late and sudden onset of the signs of a major abdominal hæmorrhage; and the total absence of any history of trauma.

Reviews of Books

Researches in Clinical Physiology

Sir ALMROTH WRIGHT, MD Dubl., FRCP, FRS, principal of the institute of pathology and research, St. Mary's Hospital, London. (Heinemann. Pp. 163. 12*s.* 6*d.*)

This is the second volume of collected researches from the inoculation department of St. Mary's Hospital, Paddington. Provocative as ever, Sir Almroth Wright opens the series with a volley of small-shot, directed at physiologists and clinicians alike, which stings most where least deserved. No clinical teacher who labours to sift physiological knowledge for the better mental digestion of his students can enjoy the intimation that he knows nothing about it; no zealous physiologist will relish the bitter pill that although he knows all about it he keeps it to himself. Yet many readers will paste the flaps of the dust-cover, where this preface appears, into the fly-leaf of the volume. Maybe this astringent banter, which passes from bench to bedside and back again, exerts on those who explore the physiological background of practical clinical problems a healthy protection against humbug. Certainly the British Isles have produced notable workers in this field, among them the author of this volume. Wright is perhaps best known for his pioneer work on the coagulation of the blood—much of which is here reproduced—and his classic work on immunology. The present series shows how his interest in the coagulability of the blood spilled over into half a dozen other fields, still leaving him sufficient energy to pursue independent investigations. The student may well add to his store of facts by reading this book—indeed the author recommends it to the self-educated for this purpose—but its greatest value is as an inspiration rather than as a work of reference. Here we have the pioneer spirit—practical, direct and ingenious—applied to everyday problems of medicine. No abstruse technical knowledge is needed to appreciate the quality of the thought and work, though the essence of the latter is the application of scientific method and known scientific facts to medicine. In this respect the book is superior to a text-book or even the usual type of monograph. It is not comprehensive of any subject; the reader may have no use for some of the knowledge he will acquire; but he will read it for the pleasure of "seeing the wheels go round," and for the contact with a stimulating personality which it affords.

Fractures and Dislocations

Editors: Sir HUMPHRY ROLLESTON, Bt., MD Camb., FRCP; ALAN MONCRIEFF, MD Lond., FRCP. (Eyre & Spottiswoode. Pp. 104. 7*s.* 6*d.*)

THIS symposium of articles which have appeared in the *Practitioner* fulfils its aim of providing modern expert opinion on bone and joint injuries in easily readable form. Each of the eight chapters embodies the practice of its writer and quite naturally some personal preferences tend to be stressed. For instance McMurray, in discussing the treatment of fractures of the femoral neck, describes in detail the operation which has given such good results in his hands, without fully setting out the advantages of a successful nailing operation. Recent theories of traumatic ischæmia following injuries of the elbow are considered, but methods of treatment based on these theories are not fully described. A more serious omission perhaps is a chapter on functional activity, when the problems of rehabilitation are so much in the public eye. These could easily be made good another time and the "booklet" as it stands is an excellent epitome of ways and means in a rapidly developing surgical craft.

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Synopsis of Tropical Medicine

Sir PHILIP MANSON-BAHR, CMG, MD Camb., FRCP, senior physician, Hospital for Tropical Diseases, Royal Albert Dock and Tilbury Hospitals, London. (Cassell. Pp. 224. 7s. 6d.)

MANY doctors are dealing with tropical diseases for the first time, and in conditions where they must rely largely upon their own knowledge, judgment and initiative. RAMC officers will mostly have attended a short course in tropical medicine but time has not been available to cover the whole ground, and the need for a handy book of reference has been widely expressed. The author, who is a recognised master of the subject, has more than met the need in this book. Chapters deal with the protozoal infections, malaria, leishmaniasis, trypanosomiasis, amœbiasis; the spirochætal diseases, relapsing fever, seven-day fever, rat-bite fever and yaws; the various rickettsial infections and bartonellosis. Bacterial infections common to the tropics include the plague group, the bacillary dysenteries, cholera, the enteric fevers, leprosy and so forth. Then come the virus infections, yellow fever, Rift Valley fever, dengue, phlebotomus fever, psittacosis, the pock diseases, rabies, lymphogranuloma inguinale and some types of encephalitis. Fungal infections, nutritional diseases such as beriberi, scurvy, pellagra and sprue receive attention. Diseases directly due to climatic conditions are described, as well as the effects of various tropical vegetable and animal poisons. Accounts are given of the metazoal diseases, arthropod, fly and leech infections, and detailed descriptions of diseases associated with the various trematode, nematode and cestode infections. Finally a short chapter deals with the commoner clinical laboratory procedures for the investigation of tropical diseases. Five plates show good line drawings of malaria parasites, mosquitoes and other intermediary hosts; the intestinal protozoa and ova are also included. The author has followed the usual scheme of geographical distribution, ætiology, pathology, clinical features, sequelæ, diagnosis, treatment and prophylaxis but has written in note form so that much information has been compressed into small space, including all the latest developments. Although produced at very short notice there are few errors; most of these are typographical and none is serious. The work is well printed, and slips easily into the pocket of the Service tunic or battle-dress.

Angina Pectoris

Nerve Pathways, Physiology, Symptomatology and Treatment. (New revised ed.) HEYMAN R. MILLER, MD, associate attending physician, Montefiore Hospital, New York City. (Heinemann. Pp. 289. 21s.)

THE description of the anginal attack in this book seems to refer to acute cardiac infarction, or at least comes closest to that; while the commoner variety with pain or discomfort on effort is neglected. If the diagnosis of angina was withheld until the picture drawn by the author was encountered it would not be made very often. Dr. Miller regards angina as "an expression of an abnormal physiological activity of the autonomic nervous system as a whole" and gives the impression that coronary atheroma, while not altogether negligible, is of secondary importance. Hence he is able to visualise violent attacks where "no serious cardiovascular lesion exists" and does not distinguish effort-angina from effort-syndrome. The anatomy of the nerves of the heart takes up a large part of the book and is thoroughly well done.

New Inventions

SIMPLE MODIFICATION OF THE WATERS CARBON-DIOXIDE ABSORBER

THE Waters carbon-dioxide absorber is still the most efficient, inexpensive and portable absorber obtainable. It has, however, three drawbacks—the patient may inhale soda-lime dust; the canister soon becomes very hot and must be changed; and the anæsthetist must hold the canister in his hand or arrange a support for it so that the airway remains clear and the system does not leak. The circle absorber, on the other hand, is less efficient and less portable than the Waters, but it prevents inhalation of soda-lime dust, the canister never gets more than warm, and the position of the canister does not inconvenience the anæsthetist.

The simple device here described, interposed between the patient and a Waters absorber, rids it of the disadvantages enumerated and yet retains its good features. The apparatus works on the same principle as the circle absorber, never allowing expired and inspired gases to mix. During expiration gases are blown along a tube, through the canister into a rubber bag; during inspiration the same gases are drawn from the bag through the canister again in the opposite direction along a separate tube.

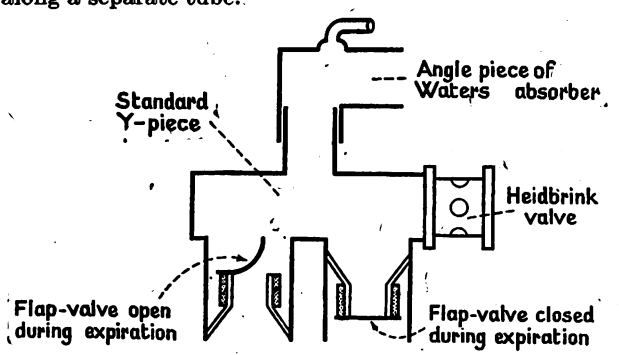

Fig. 2—Section of standard Y-piece showing two flap valves in position, one facing inwards and the other outwards.

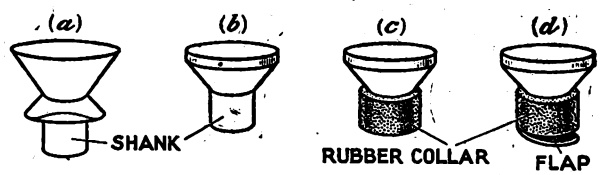

Fig. 1—(a) Metal end of Hewitt's airway. (b) The expanded end of (a) is ground down to fit into the wider limbs of the Y-piece. The shoulders are turned off and the shank cut to ½ in. in length. (c) A collar of rubber pressure tubing ½ in. long is slipped over the shank. (d) A disc of rubber tissue covering the end of the shank and the collar is stuck to the collar at one point with rubber solution.

The device may be readily made from the metal ends of two Hewitt's airways and two standard Y-pieces. Fig. 1 makes clear the steps in the construction of a flap valve from an airway; two of these are required and are fitted into one of the Y-pieces (fig. 2). To complete the attachment, the Y-piece with the valves is connected to the second Y-piece with corrugated rubber tubing.

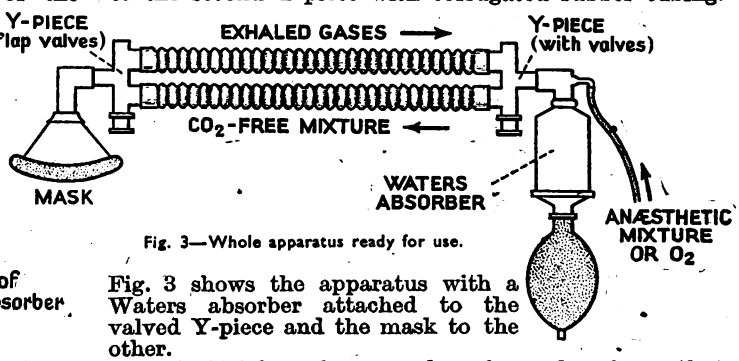

Fig. 3—Whole apparatus ready for use.

Fig. 3 shows the apparatus with a Waters absorber attached to the valved Y-piece and the mask to the other.

Clinical trial on a large number of cases has shown that the device does not reduce the efficiency of the Waters absorber. Estimations of the CO_2 content of the gases contained in both corrugated tubes were made; in a typical case these were 5·2 c.cm. per 100 c.cm. in the expiratory tube and 0·02 c.cm. per 100 c.cm. in the inspiratory. It was also found impossible to withdraw soda-lime dust from the canister by an air-pump attached to the mask end of the circuit.

Royal Victoria Infirmary, Newcastle-on-Tyne.

F. J. PRIME, M B DURH, Anæsthetic Registrar.

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THE LANCET

LONDON: SATURDAY, MAY 8, 1943

TUBERCULOSIS GOSPEL

GOOD news must be true news, as a radio preacher said on Sunday; and the struggle of the common man against Koch's bacillus has been embittered by a succession of unfulfilled expectations. ARTHUR LATHAM was the first to teach us that an easy mind is the largest factor in recovery from tuberculous infection, but the alleged hopefulness of the poitrinaire is now recognised for what it always was, just one of the symptoms of a toxæmia which implied a stage of disease already far advanced—and then only present in those of easy circumstances. To the wage-earner the threat of consumption carries an anxiety which has not only hindered its early recognition but which is also a serious menace to recovery. Why labour the obvious like this? Admittedly before the war the administrative problem of tuberculosis was baffling and the futility of our efforts was making place for an uneasy reliance on the steady if slow diminution of the disease as part of a secular movement attributed vaguely to changes in seed, or soil, or environment. Then came the war with its alarming increase in the number of new civilian cases and deterioration of established ones, coupled with the urgent need to eliminate the disease from the Fighting Services at whatever cost. And there came at the same time an awakening of the conviction, of which the Beveridge report is only one example, that in a humane civilisation the recovery of health must not be dependent on earning capacity. The dramatic moment arrived with the announcement, too good to be believed at the time, by the Minister of Labour that those who drop out of employment, whether military or civil, as a result of tuberculous infection are to have precisely the same chance of getting back into it as those who have suffered wounds or accidents. And this was capped by the Minister of Health's instruction to the relevant authorities that the treatment provided was no longer to be rendered nugatory by anxiety about dependants and unpaid rents; economic fears were to be treated like fever or night-sweats as symptoms to be met by appropriate treatment.

So far the position would not seem greatly different from what might have been done before the war if public opinion had been more sensitive and public officers more conscientious. It will be difficult in any case to make up leeway when sanatoriums already have waiting-lists and places are restricted by shortage of nursing and domestic staff. And now an entirely new factor has been introduced by the possibility of detecting tuberculous disease at an early stage. Signs and symptoms reveal disease which is well established and requires measures far more prolonged and exacting than those which would ensure recovery if infection were discovered as soon as it has taken hold. Immunity tests have failed because they register only acquaintance with the tubercle bacillus and not a surrender to its attack. But the use of X rays is coming into its own and mass radiography, in its new technical refinement, can be trusted to reveal disease not yet so firmly established as to require all the big guns of therapy. Experience of routine examination of one group of the population, students in training at a hospital—a heavy and exacting life—has shown that it is rarely necessary to send the "positive filmer" to a sanatorium. Some modification in his habit or manner of life, some relief of undue strain, some addition to diet, was sufficient to put the student again at top of his threatened disease. And this kind of supervision is just what was provided in the dispensary system which was the invention of ROBERT PHILIP'S genius in Edinburgh fifty years ago. Mass radiography, especially as it can only be introduced slowly, need not therefore put an intolerable strain on the local authorities which carry out loyally the scheme of the Minister of Health, and his opposite number in Scotland, set out on a later page.

IMPORTANCE OF THE Rh FACTOR

THE rhesus (Rh) factor in blood is of practical importance as well as academic interest. A circular[1] containing recommendations by a subcommittee of the Medical Research Council makes it clear that application of present knowledge of this factor would considerably reduce the number of serious hæmolytic reactions following transfusion and should much improve the treatment of hæmolytic anæmia of the newborn.

The red cells of the majority of human beings contain, irrespective of their ABO group, an agglutinogen, Rh.[2] The designation Rh is used because a similar agglutinogen is found in the red cells of the rhesus monkey, and the presence of the agglutinogen in human red cells was first discovered by testing them against an anti-rhesus serum. Only about 15% of people in this country lack the Rh agglutinogen.[3] In the case of the ABO groups, persons whose red cells lack the A or B agglutinogens have the corresponding anti-A or anti-B agglutinins in their plasma. Persons whose red cells lack the Rh agglutinogen (Rh-negative) do *not* normally have anti-Rh agglutinins in their plasma, but are liable to form them if Rh agglutinogen is introduced into their circulation. It may be introduced in one of two ways: (1) in persons of both sexes, when Rh-positive blood (whose red cells contain the Rh agglutinogen) is transfused,[4] and (2) in women, after becoming pregnant with an Rh-positive fœtus (the fœtus having inherited the Rh agglutinogen from the father). From the transfusion point of view, the importance of the presence of anti-Rh agglutinins, developed as a result of transfusion or of pregnancy, is that a subsequent transfusion of Rh-positive blood will prove incompatible. Since 85% of bloods are Rh-positive, the chances of incompatible blood being given in such a case, when transfusion is required, are considerable unless Rh-negative blood (of suitable ABO group) is selected.

1. The danger of hæmolytic transfusion reactions due to immunisation of the recipient to the Rh factor. Ministry of Health Circular (EMSI 413).
2. Landsteiner, K. and Wiener, A. S. *J. exp. Med.* 1941, 74, 309.
3. Boorman, K. E., Dodd, B. E., Mollison, P. L. *Brit. med. J.* 1942, ii, 535 and 569.
4. Wiener, A. S. and Peters, H. R. *Ann. intern. Med.* 1940, 13, 2306.

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Apart from pregnancy, the development of anti-Rh agglutinins by Rh-negative persons usually occurs only after the repeated transfusion of Rh-positive blood, and as a rule it can then be suspected from the poor response to transfusion—e.g., failure of the hæmoglobin to rise satisfactorily, or the onset of jaundice or more serious signs of hæmolysis. The development of anti-Rh agglutinins by Rh-negative women during pregnancy is potentially more dangerous because the first evidence of it may be a serious hæmolytic reaction following a first transfusion.* A clue may, however, be provided by the obstetrical history. When anti-Rh agglutinins are formed in the plasma in response to the passage of the Rh agglutinogen from the fœtus across the placenta, the anti-Rh agglutinins pass back across the placenta into the fœtal circulation and destroy some of the fœtal erythrocytes.[5] This hæmolysis is the central feature of the group of conditions known as erythroblastosis fœtalis. The classical forms of this disease are well known: the infant may be born dead or moribund and exhibit universal œdema (hydrops fœtalis); it may be born jaundiced or may develop severe jaundice within 48 hours of birth (icterus gravis neonatorum), or it may be normal at birth but develop severe anæmia within a few days (congenital anæmia of the newborn). Some of the infants born dead, often before term, are outwardly normal, although pathological examination may reveal the true state of affairs. The term "erythroblastosis" suggests that the formation of nucleated red cells is the essential feature of the disease, but PARSONS and his colleagues[6] have long maintained that the primary process is a destruction of the infant's red cells, that the erythroblastosis is merely a response to this destruction, and that the term "hæmolytic anæmia of the newborn" should be used instead. An even better name would be "hæmolytic disease of the newborn (or of the fœtus)",[7] because the infant may not be anæmic although its red cells are being destroyed at an abnormal rate. The disease in its various forms is not uncommon: its incidence has in fact been estimated at 1 in 400 pregnancies.[8]

Hæmolytic disease of the newborn should not, of course, be confused with hæmorrhagic disease of the newborn, a condition attributable to deficiency of prothrombin and curable by intramuscular injection of adult blood or by injection of vitamin K. Hæmolytic disease of the newborn should be treated by the intravenous transfusion of Rh-negative blood[5]; such blood survives for long periods in the circulation of affected infants, whereas Rh-positive blood is usually rapidly destroyed.[9]

Anti-Rh agglutinins, unlike the ordinary anti-A and anti-B agglutinins, are "immune bodies" and therefore increase at first in strength, then decrease and finally disappear. They may persist, however, for at least 5 years,[8] and sensitivity to the Rh agglutinogen may last even longer. If there has been evidence of hæmolytic disease in any infant—past or present—one must presume that anti-Rh agglutinins are present in the mother's blood and that transfusion will be extremely dangerous for her unless the blood comes from an Rh-negative donor of suitable group. This should be a useful safeguard; but, unfortunately, while an infant remains in utero there may be nothing to suggest that it has hæmolytic disease. Again, if an Rh-negative woman receives repeated transfusions of Rh-positive blood, she may form anti-Rh agglutinins so that in her next pregnancy her infant develops hæmolytic disease.[10 9] One must look forward, therefore, to the time when Rh-negative women will be detected at the antenatal clinic, so that if they have to be transfused they will be given Rh-negative blood. For the time being, it would be a substantial advance if no mother whose present or previous infant has shown signs of hæmolytic disease were transfused except with Rh-negative blood of suitable ABO group. Actually the Rh factor is not responsible for quite all cases of hæmolytic disease of the fœtus, but only for some 92–94%.[5 8] Where the fœtal erythrocytes contain A or B agglutinogens and the mother's erythrocytes lack them, the fœtal cells may be destroyed by anti-A or anti-B agglutinins; while in other cases rare blood-group factors, present in the fœtal erythrocytes but not in the maternal erythrocytes, may be concerned. These facts have to be appreciated if clinicians are to interpret correctly the results of laboratory tests in suspected cases of hæmolytic disease of the newborn.

It is not easy to get reliable results when making tests for Rh agglutinogens and anti-Rh agglutinins. The reactions are weaker than the ordinary iso-agglutination reactions, and can be detected only by the use of a tube technique; they are almost always stronger at 37° C. than at room temperature. The serum may have to be titrated against the cells to show any reaction,[11] and different sera do not give parallel reactions,[5 2 3 11] probably because there are different kinds of Rh agglutinogens and anti-Rh agglutinins. Hence it seems likely that the tests should at present be left to blood-transfusion centres and other special laboratories. But these centres need the help of clinicians in maintaining stocks of suitable sera, which are most easily obtained from immunised women. They can do it only if clinicians will have their cases tested and then persuade women with strong anti-Rh agglutinins to give some of their blood for the preparation of test sera.

THE SEMEN IN STERILITY

EXPERT seminologists in this country are still scarce, and their knowledge has so far not permeated the vast bulk of clinicians and pathologists called in to report on the fertilising power of a given specimen of semen. It is not sufficient to glance down a microscope and report no sperms, sperms in plenty, mobile sperms, or sperms dead: in many cases these are false readings and the patient is misdiagnosed, often with serious consequences to marital equilibrium. The examination of the male in a case of sterility consists of a careful clinical survey with special attention to the past history—puberty, adolescence, pre-

* On another page practitioners are invited to help by reporting promptly any such accidents.

5. Levine, P., Katzin, E. M., Burnham, L. and Vogel, P. *Amer. J. Obstet. Gynec.* 1941, 42, 925.
6. Parsons, L. G., Hawksley, J. C. and Gittins, R. T. *Arch. Dis. Childh.* 1933, 8, 159.
7. Levy, H. *Brit. med. J.* 1942, ii, 738.
8. Javert, C. T. *Surg. Gynec. Obstet.* 1942, 74, 1.
9. Mollison, P. L. *Proc. R. Soc. Med.* 1943, 36, 5, 221.
10. Diamond, L. K. *New. Eng. J. Med.* 1942, 227, 857.
11. Taylor, G. L., Race, R. R., Prior, A. M. and Ikin, E. W. *Brit. med. J.* 1942, ii, 572.

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marital sexual experience, previous marriage, incidence of mumps, gonorrhœa or syphilis—and an inquiry into the present sexual habits, frequency and efficiency of coitus. The patient's general physical condition and development is then assessed, constitutional and metabolic disorders being eliminated or investigated. This may necessitate an evaluation of the basal metabolic rate, the sugar tolerance or the blood cholesterol, many subfertile men being inclined to obesity and hypothyroidism and their fertility improved by simple diet and thyroid medication. The next step is the urological examination of the external genitalia, prostate and vesicles, and the exclusion of congenital and acquired defects such as hypospadias, ectropion testis, undescended testis, hydrocele, epididymitis, stricture, prostatitis, vesiculitis, and so forth. This is followed by the most important single investigation, the examination of a specimen of semen.

Semen can be collected by two methods, masturbation or condom, and in each certain details must be observed or the specimen is vitiated. Both have certain inherent defects, and some men find considerable difficulty in obtaining either, but these obstacles can be overcome by the tactful coöperation of the doctor. A masturbation specimen must be collected in a clean dry wide-necked glass receptacle with a stopper. The glass must be clean, and for preference old and much used since new glass reacts injuriously on spermatozoa; it must be dry because hypotonic solutions affect sperm viability. Such a specimen can be collected in or near the laboratory and be examined at once, and this is an advantage, but some nervous men find this method distasteful or impossible, and for them the condom must be used. An ordinary rubber condom is satisfactory provided it is thoroughly washed in running water and then dried on clean filter paper; the outside only should be powdered before re-rolling. Continence should be enjoined for a week before the production of the specimen, which should be obtained by ordinary coitus with as short a delay as possible before it is examined. After coitus it is best to transfer the contents of the condom to a glass container, and this is best done by snipping the end of the condom with scissors. If transport takes time the glass container should be kept cool—in a thermos flask of cold tap water—never warm, so it should not be put in that handy human incubator the waistcoat pocket. All these trivial details are important and can be best secured by issuing each patient with a small typescript card of instructions.

Before deciding what examinations should be performed on the seminal fluid it is well to define normal semen. Its volume should lie between 1·5 and 3·5 c.cm.: anything less than 1·5 c.cm. being considered oligospermia. When first ejected semen is viscous, but it soon gelatinises and liquefies, probably from some enzyme action. Failure to liquefy may be a factor in impairing sperm motility and should be noted. Semen consists of two unities—seminal fluid and formed cellular elements including spermatozoa, epithelial cells and crystals. The seminal fluid is slightly alkaline with a mean pH of 7·7 and it has considerable buffering powers to counteract the acid vaginal secretions and the lactic acid produced by the breaking down of glucose by its own cellular population, the spermatozoa.[1] The average population is 200 million spermatozoa per gramme of semen, though many fertile men have more or less than this figure. The morphology of the spermatozoa is probably the most important part of the whole examination, though recent work[2] on diffusion factors suggests that evidence of the amount of hyaluronidase present to clear the path for the sperm may soon be considered equally informative. The head should be regularly pyriform and averages about 4·5μ in length; its anterior part stains less deeply than the posterior, which has a greater affinity for hæmatoxylin and nuclear stains. The neck shows two knobs, anterior and posterior, and from the latter the axial filament originates. The middle piece is cylindrical and tapers into the tail, which consists of a thread and a surrounding sheath and is about 50μ long. Variations from this normal include atypical, miniature, and teratological types: the size of the head may vary, or its shape may be irregular or staining atypical. There may be two-headed spermatozoa, or some with two tails. The middle piece may be surrounded by irregular cytoplasmic masses or almost absent; the tail may be absent or coiled round the head. In a normal cell population there will be a large proportion of normal uniform types (isozoöspermia). The next step is the assay of the motility and viability of the spermatozoa. A hanging-drop preparation of semen is made and the visual field of the eyepiece of the microscope cut down by a disc of black paper from which a narrow section has been removed. The number of motile sperms in a given field is counted and then the number of immotile ones: less than 20% motile spermatozoa is considered very low. Viability can be assessed by doing serial motility counts at 6, 12 and 24 hour intervals after collection, the semen being kept stored at 4° C. The determination of sperm population is done on a hæmocytometer; the diluent used is Ringer's solution with methylene-blue added. The morphological examination is performed after centrifuging 0·2 c.cm. of semen, diluted with Ringer's solution containing 0·5% chloramine. A film is made of the deposit as with blood and this is stained with hæmatoxylin and eosin, or with fuchsin, eosin and Loeffler's methylene-blue. In addition to spermatozoa this will show up red and white blood-cells, any excess of which should be noted. The abnormalities that may be encountered are legion. Stress should be laid primarily on the morphology, number, motility and viability of the spermatozoa, and any gross departures from the normal, which is an arbitrary one, will suggest lowered fertility. If more than 20% of spermatozoa are abnormal the fertility of the husband must be suspect; if over 30% are abnormal he is certainly subfertile. But a childless marriage must always be regarded as a dual problem with factors in both partners; a small degree of infertility in the husband will be vital if he is married to a comparatively infertile wife but of little importance if his wife is highly fertile. For this reason there is no point at which the subfertile male becomes entirely responsible for the absence of children.

1. Much of the information in this note is taken from *Sterility and Impaired Fertility*, by C. Lane Roberts, Albert Sharman, Kenneth Walker and B. P. Wiesner (London, 1939), to which excellent work readers requiring further details are referred.
2. See *Lancet*, April 17, 1943, p. 495.

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Annotations

CENTENARY OF A FELLOWSHIP

THIS year the Royal College of Surgeons of England will celebrate a hundred years of existence under its present name and constitution. Its actual history is of course far longer, but there were several false starts. In 1745 the Surgeons Company separated from the Barber-Surgeons, and when this company expired with the eighteenth century the "Royal College of Surgeons in London" reigned in its stead. The House of Lords defeated the attempt of London surgeons to secure themselves a privileged constitution by Act of Parliament, but they were successful in obtaining a royal charter in 1800 which provided for a coöpting council with life tenure and sole right to the examinerships and no representation for the two thousand ordinary members. In March, 1824, the court of examiners agreed to accept as candidates only those who had been taught by London hospital surgeons—that is, by themselves. Thomas Wakley, who six months earlier had founded the *Lancet* to break down the monopoly of the London hospital staffs in up-to-date medical information, organised an agitation against the college council, and won wide support from country surgeons. On Feb. 18, 1826, he convened a public meeting of members of the college and persuaded them to petition Parliament to abrogate the charter. A year later the House of Commons asked for an account of the public money lent or granted to the college. The college council now began to bestir themselves. Through the thirties they were busy rebuilding their house, to display worthily the Hunterian Museum and their fine library. Richard Owen, the rising star of anatomists, was appointed conservator, and Robert Willis, already known as a scholar-physician, became librarian; both were members of the college. In 1835 the council began to draft a more liberal charter, but dropped the project on learning that Parliament was considering reform of the profession as a whole. By 1842, however, the Government suggested that the time was ripe for the new charter. Under the inspiration of Benjamin Brodie, then vice-president, the new order of fellows was instituted, which was to be the cream of the surgical profession, selected by examination, and was to have the right of electing the council from its own number. The privilege and tenure of council and court were at the same time reasonably curtailed, and the name of the college—and therewith its interests—was enlarged from "Surgeons in London" to "Surgeons of England." The new charter ordering all these reforms received the Queen's assent on Sept. 14, 1843, and though we may expect and hope for further changes before another hundred years are past, we all have reason to wish the college many happy returns of the day.

REINFORCING THE ANTIBODY

VARIOUS attempts have been made to improve immune sera by elimination of immunologically inert proteins. Eggerth[1] now describes what is apparently the first example of an increase in antibody activity by alteration of the serum protein itself. On treatment with ninhydrin, sera from both the horse and the rabbit were found to undergo physicochemical changes, and sometimes the agglutinin content rose. Thus a rabbit antityphoid serum which, before treatment with ninhydrin, contained 1:100 H-agglutinin units per mg. nitrogen, contained 3300 units after 30 minutes, and a fraction was obtained by precipitation which contained 16,000 units. Normal rabbit serum treated with ninhydrin did not agglutinate typhoid H or O suspensions, or pneumococcal antigen, and rabbit antityphoid serum treated with ninhydrin did not agglutinate any of a variety of organisms tested, including *Bact. coli*, *Staph. aureus*, proteus OX 19 or pneumococcus types I and II. It seems therefore that the reactivity of ninhydrinised serum is entirely due to specific antibody.

Eggerth suggests four possible explanations of the increase in H-agglutinin activity after treatment with ninhydrin: (1) the destruction of some inhibitory substance; (2) the breakdown of large antibody aggregates, so that the number of active antibody molecules rises; (3) an increase of avidity of weak combining groups, or the uncovering of groups not formerly available; and (4) the destruction of non-specific hydrophilic groups of the antibody, rendering it more hydrophobic and less soluble. The third explanation, he points out, would accord with the "specific aggregation" theory of Marrack, of Heidelberger and Kendall, and of Hershey. This states that immune aggregates are lattices built up by union of polyvalent antibody with antigen; an increase in the number of sufficiently avid combining groups is therefore necessary for an increase in agglutinin titre. The fourth explanation he correlates with the "non-specific aggregation" theory of Eagle and of Hooker and Boyd, who maintain that, after combination of antigen and antibody, aggregation will occur only if the surface groups are chiefly hydrophobic, and the charge is below the critical level. As ninhydrin destroys the free amino groups of protein, which are polar, the antibody, if a protein, would become more hydrophobic and less soluble. If this explanation is accepted, treatment with ninhydrin should increase the titre of all agglutinating sera, which it does not; so one would have to postulate, in cases where the titre is not increased, a second contrary effect, such as a destruction or weakening of combining groups.

From investigations with modified antibodies, "it seems clear," Eggerth says, "that the combining groups or sites are rather resistant to the action of heat, chemicals, and enzymes, and are not destroyed unless the action is vigorous and prolonged. This appears likewise true of the ninhydrinised antibodies. The groups or surfaces of the antibody-molecule that are responsible for the secondary immune reactions, such as agglutination, seem to be more susceptible of alteration."

1. Eggerth, A. H. *J. Immunol.* 1942, **45**, 303.

THE URETERS IN PREGNANCY

IT is now generally agreed that during pregnancy the ureters dilate, that the dilatation affects the right ureter more than the left, and that these changes are attributable to two factors—first, pressure of the pregnant uterus on the ureter at the brim of the pelvis, and, secondly, a lowering of the tone of the ureter, making it more easily obstructed. Hundley, Diehl and Diggs[1] have studied the effect on the ureteric tone of giving 2 mg. of stilbœstrol twice daily over a period of 10 weeks. In a series of patients thus treated they noted an increase of tone; more vigorous peristalsis was demonstrated by tracings on the hydrophorograph. Another group of women received, weekly for 9 weeks, intramuscular injections of 8 mg. of the progesterone preparation 'Proluton,' together with 280 mg. of 'Pranone' each week by mouth, making a total dose of 72 mg. proluton and 2520 mg. pranone. The result of this treatment was a loss of ureteric tone clearly evident within 4–5 weeks, but pyelograms were not taken, so it is not known whether the ureters became dilated. The tracings from these experiments are striking, but it is hard to apply the results to the findings in pregnancy, unless on the Cohen-Marrian hypothesis that, except just before labour, the œstrogens in the blood are in the combined and inactive form. As progesterone, at least of corpus-luteum origin, does not increase in the blood after the fourth month of pregnancy, whereas the atony of the ureter reaches its peak at the sixth or seventh month, it seems likely that

1. Hundley, J. M., Diehl, W. K. and Diggs, E. S. *Amer. J. Obstet. Gynec.* 1942, **44**, 858.

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in the pregnant woman there must be other substances capable of reducing ureteric tone. In the pregnant woman of five or six months' pregnancy, œstradiol benzoate and stilbœstrol in therapeutic doses do not increase ureteric peristalsis.

Thus there are still blanks in our knowledge of the mechanism by which atony of the ureter and stasis of urine are produced in the pregnant woman. A good deal remains to be done also concerning the activity of the ureter in various complications of pregnancy. Baird [2] found that atony and dilatation were unusual in the ureters of patients suffering from pre-eclamptic toxæmia; but he informs us that in one case of severe pre-eclampsia, where the ureters were found to be very irritable, re-examination of the ureters after the death of the fœtus demonstrated complete atony. The death of the fœtus had been followed by rapid fall of blood-pressure, subsidence of œdema, and disappearance of albumin from the urine. When it is remembered that the tone of the ureters improves considerably just before labour, and that in pre-eclampsia the blood-pressure usually rises and the albumin increases just before labour, it looks as if the substance that causes the toxæmia—possibly by its action on the blood-pressure—also acts on the ureters, increasing their tone. The work of Hundley and his associates suggests that œstrogen is such a substance. On the other hand Smith and Smith [3] state that in their opinion the toxic manifestations of pre-eclampsia are preceded by a progressive progesterone and œstrogen deficiency which is closely allied to rapid destruction of the œstrogens and the liberation of some toxic product.

The immense amount of research now being carried out into conditions of the renal tract during pregnancy, especially in the United States, is well summarised in a book by Crabtree [4] which is now the standard work on the subject.

STREPTOCOCCAL MUSCLE GANGRENE

GAS-GANGRENE is a clinical condition in which, at any rate in the early stages, neither gas nor gangrene may be obvious enough to help in the diagnosis. Most of the surgeons who today deal with the wounded patient grew up in medicine in the period between the two wars, and few of them have any extensive clinical experience of the condition. In a disease like this, with an incubation period sometimes as short as an hour or two, early diagnosis is essential, and the surgeon naturally turns to the laboratory for help. The bacteriologists may find in the wound exudate a variety of bacterial forms that may suggest a gas-gangrenous infection, but neither the direct examination of the exudate—except perhaps along the lines suggested by McClean, Rogers and Williams last March [5]—nor the subsequent cultivation of gas-gangrene bacilli, can clinch the diagnosis, for large numbers of wounds are merely contaminated with these organisms. For this reason, the surgeon is inclined, with some justice, to value the results of bacteriological investigation only as material for a retrospective consideration of his cases, not as an immediate aid to diagnosis. But however justifiable the attitude may be, it should not be allowed to detract from the importance of as extensive a bacteriological investigation as possible.

Our knowledge of wound infection and immunity to wound infection is still scanty, and we could ask for no better demonstration that there is much to learn in this field by the practice of first-class bacteriology than Major MacLennan's demonstration (on p. 582) of a non-clostridial infection of muscle that in many respects resembles gas-gangrene. In 8 cases from six different hospitals in the Middle East he has discovered a massive infection of muscle by *Streptococcus pyogenes*, an infection that responded readily to oral and local administration of sulphonamides in conjunction with conservative surgical toilet of the wound. No sporing bacilli were found. In 4 of the cases anaerobic streptococci were also present, and may have played some part in the evolution of the condition. But the notorious insensitivity of these cocci to sulphonamides and the ready response of the condition to sulphonamide drugs, suggests that the anaerobic streptococci were of secondary importance. Differential diagnosis appears to be possible on clinical grounds, and direct examination of a muscle smear reveals vast numbers of streptococci and pus cells.

There are two schools of thought concerning the frequency of gas-gangrene in muscle. One holds that gas-gangrene is liable to occur more in deeper than in superficial wounds, and deeper wounds of necessity involve muscle; the other, that muscle is peculiarly susceptible. MacLennan's report of a peculiar streptococcal infection of muscle bears out the second school; for just as gas-gangrene bacilli in the subcutaneous tissues produce the so-called anaerobic cellulitis, and in muscle the true gas-gangrene, so, as MacLennan points out, hæmolytic streptococci apparently produce in the skin a "necrotising erysipelas," and in muscle a peculiar and characteristic condition that resembles the classical gas-gangrene.

MODIFIED ENTHUSIASM FOR PETHIDINE

THREE reports on the analgesic pethidine published in the last few months have widened our knowledge of its clinical pharmacology but have differed too widely to allow of definite conclusions as to its value in the relief of pain. Fitzgerald and McArdle [1] found that in the treatment of 12 patients with severe pain arising from various neurological conditions pethidine was as effective as, and in some instances superior to, morphine. Branwood,[2] on the other hand, after trial in 23 patients, thought it of no value at all for pain of the neuritic type. Christie [3] and his collaborators, on the basis of an investigation involving 335 patients with pain, take up an intermediate position by rating pethidine superior to the commonly used mixture of acetylsalicylic acid, phenacetin and codeine but inferior to morphine. From their figures, however, it appears that only in pain of neuralgic and vascular origin did pethidine prove more efficacious than tab. codeinæ co. (NWF). In pain resulting from trauma and arthritis or fibrositis the codeine compound actually came out the better, though not significantly so. Branwood is certain of the effectiveness of pethidine in the relief of spasm in biliary, renal and intestinal colic, and of hypertensive headache, as would be expected from the well-marked antispasmodic action obtained experimentally. One of the desirable features claimed for the drug was the relief of pain without impairment of consciousness or coördination, but it made some of Branwood's subjects sleepy even when their pain was not relieved. All three papers agree that toxic effects are neither frequent nor serious. Mild gastro-intestinal upsets and giddiness with minor visual disturbances are the chief manifestations and all are transient; they are more serious when the drug is given intravenously. The nausea and dizziness are associated with a fall of blood-pressure, both systolic and diastolic, beginning within three or four minutes of intravenous administration, while after intramuscular or subcutaneous injection the fall is much less and more gradual. For this reason Branwood suggests that pethidine is contra-indicated in shock and that the intravenous route is better avoided, especially as it offers no advantages over the subcutaneous. Subcutaneous injection appears to give better results than

2. Baird, D. *J. Obstet Gynæc.* 1931, 38, 516.
3. Smith, G. van S. and Smith, O. W. Quoted by Crabtree (ref. 4).
4. Crabtree, E. G. Urological Diseases of Pregnancy. Boston, 1942.
5. McClean, D., Rogers, H. J. and Williams, B. W. *Lancet*, March 20, 1943, p. 355.

1. Fitzgerald, G. and McArdle, B. *Lancet*, 1943, i, 296.
2. Branwood, A. W. *Edinb. med. J.* 1943, 50, 177.
3. Christie, R. V. *Lancet*, 1943, i, 294.

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administration by mouth. On the continent and in America the possibility of addiction has been mentioned, but in Christie's series this was not encountered: one patient, in fact, received pethidine continually for three months and had no withdrawal symptoms when the drug was stopped. On the whole, the evidence does not justify the original hopes [4] that pethidine is the looked for substitute for morphine, but it is now established as an efficient antispasmodic with few side-effects and little or no tendency to addiction.

BRONCHIECTASIS IN CHILDREN

THE treatment of bronchiectasis by operative resection of the affected part of the lung is now well established, but the desirability of doing this early in life is not so generally recognised. In 38 such operations in patients between the ages of 4 and 16 years Tudor Edwards [5] had no postoperative deaths, whereas there was a 12% mortality in the whole of his series of 199 patients of all ages. The satisfactory way in which children withstand both the operative and postoperative dangers of this procedure was also emphasised by Bohrer and Lester.[6] It is not surprising that the more elastic tissues of a child should accommodate better than the adult's for the loss of pulmonary tissue. The space occupied by a removed lobe may be filled either by further distension of the remaining lung substance or by an actual hypertrophy of this tissue. The experiments of Bremer [7] on the rat suggest that young subjects at any rate adopt the more beneficial course of hypertrophy. At a recent meeting of the Royal Academy of Medicine in Ireland, W. R. F. Collis, F. J. Henry and S. Pringle showed 6 cases to demonstrate the good results which may be expected and described their routine. They account for the fact that they have so far performed all their lobectomies without disaster on the basis of the great attention they pay to detail before, after and during operation; most of chest surgery requires the same diligence. After examination in a special non-tuberculous clinic their patients have any upper respiratory infection present attended to and are given a course of open-air treatment before coming to operation. During the actual operation there is close coöperation between surgeon and physician, so that difficulties which arise can be discussed on the spot. Blood is given during operation where necessary and is followed by a Ringer's solution, dextrose and sulphapyridine drip. The routine intravenous injection of sulphapyridine is unlikely to meet with universal approval. Collis and his colleagues do not mention the local application of sulphonamides or the importance of breathing exercises before and after operation. Nor do they express an opinion about the desirability of obtaining pleural symphysis before operation; many authorities find that the danger of postoperative collapse is so slight in children that such measures are superfluous under the age of 12 years.

THE PLACENTA AS AN ENDOCRINE ORGAN

THERE is much circumstantial evidence that the human placenta produces œstrogen, progesterone, and a "gonadotrophic" substance in large quantities. The evidence is in fact almost conclusive, but one is conscious of a prejudice against admitting the placenta into the ranks of the endocrines, partly because of its simple structure, which seems no more than necessary for its more obvious functions, and partly because of its temporary nature. Extraction by various methods shows that it is a storehouse for a number of substances, so that the mere demonstration that extracts have certain activities means little. Some years ago Kido [8] successfully transplanted human placenta into the anterior chamber of the rabbit eye in quantities too small, as judged by the lack of effect from implanting them elsewhere, to influence the ovaries by their existing content of gonadotrophic principle. In a short time the ovaries of the rabbit were stimulated to a degree commonly seen in a positive Friedman test, and active production of gonadotrophin by the transplant was inferred. The possibility of rapid, and therefore effective, absorption of preformed material from the site, and the presence of the animal's own pituitary, made these results somewhat less than conclusive, and a note by Gey and his colleagues [9] in 1938 claiming to have obtained chorionic gonadotrophin from placental cultures in vitro was welcome. Detailed results are now published,[10] showing that fluid which has been allowed to bathe roller-tube cultures of full-term, 3-month, and ectopic placentæ, gives a positive Aschheim-Zondek test after a few days, though the cultures themselves may be many weeks old. Cultures of hydatidiform mole also yield positive results. Œstrogen and progesterone have not been demonstrated, which means that the conditions of culture were unsuitable for their production, or that the quantities found in the fresh placenta have been produced elsewhere and merely stored.

Chorionic gonadotrophin, or "cyonin" as Astwood and Greep [11] have christened it, is interesting as becoming an established active principle with no known function. Though it acts on the ovaries of test animals in various ways, thereby earning the title "gonadotrophic," or at least, "gonadotropic," the results of experiments to find its action on the primate ovary are disappointing. Indeed, the human ovary is unnecessary for the maintenance of the last two-thirds of pregnancy. Is chorionic gonadotrophin responsible for stimulating the extra-ovarian source of œstrogen and progesterone, which undoubtedly exists? If, as has always seemed likely, this source is the placenta itself, are we to assume that one part of it, probably Langhans's cells, secretes a substance which makes other parts—of which there are remarkably few—secrete œstrogen and progesterone? Or has it some hitherto unsuspected function?

BEATRICE WEBB

THE death at the age of 85 of the junior partner of "Webb & Webb," later "Passfield & Webb," recalls a time, now almost forgotten, when poverty was considered not only a misfortune but a crime. Beatrice Potter left a comfortable Victorian home at the age of 19 to find out for herself how the poor live and work, and having found out she never rested until the penal side of the Poor Law was abolished and poor-law administration softened into public assistance, with the prospect of social security on the horizon. The report by Sidney and Beatrice Webb dissenting from the other members of the Royal Commission of 1905–09 generously recognised the earlier dissent of Thomas Wakley of THE LANCET from the "principle of less eligibility" advocated by the Royal Commission of 1834, and in times to come we shall often have occasion to recognise a corresponding foresight in these two Fabian progressives.

4. See *Lancet*, 1942, ii, 487.
5. Edwards, A. T. *Brit. med. J.* 1939, i, 809.
6. Bohrer, J. V. and Lester, C. W. *J. thorac. Surg.* 1939, 8, 412.
7. Bremer, J. L. *Ibid*, 1937, 6, 336.
8. Kido, I. *Zbl. Gynäk.* 1937, 61, 155.
9. Gey, G. O., Jones, G. E. S. and Hellman, L. M. *Science*, 1938, 88, 306.
10. Jones, G. E. S., Gey, G. O. and Gey, M. K. *Bull. Johns Hopk. Hosp.* 1943, 72, p. 26.
11. Astwood, E. B. and Greep, R. *Science*, 1939, 89, 81.

PATENT MEDICINES BANNED IN GERMANY.—An order made in March prohibits the manufacture of *Arzneifertigwaren* and *Spezialitäten* in Germany. The order covers all substances and preparations for the prevention, palliation or cure of diseases, complaints, and physical injuries or discomforts in man or animal which are sold already made up in packets, and are described or labelled as products of a specific manufacturer (*Klin. Wschr.* 1943, 22, 268).

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Special Articles

THE TUBERCULOSIS SCHEME

MINISTERS' CHARGE TO LOCAL AUTHORITIES

Town and county councils, as well as joint tuberculosis boards, received good warning (M of H circular 2741 dated 18.xii.42, DHS circ. 213 dated 31.xii.42) of the broad lines of the great antituberculosis scheme which they are now required by the central health departments of the United Kingdom to put into operation without delay (M of H circ. 2794, DHS circ. 36A).

MASS RADIOGRAPHY

The two blue-prints are the same in substance, except for the detailed instructions on mass miniature radiography contained only in the English memo. War-time difficulties of supply have delayed delivery of the radiographical units and except for a set to be used in the training of personnel none will be available in Scotland before the summer—when Edinburgh, Glasgow, and Lanarkshire are to be the recipients—whereas in England a set has been delivered to Lancashire and the remaining 17 sets will, it is hoped, at regular intervals in the next twelvemonth reach their destination, beginning with the county councils of London, Middlesex and Surrey, the Welsh National Memorial Association, Staffs, and then the large provincial urban centres. The opportunity has been taken of issuing the report (28 pp.) of the Standing Advisory Committee on Tuberculosis, on which the action of the two health departments is based. Mr. T. Lindsay is chairman and Dr. J. H. Harley Williams secretary of the technical subcommittee which drew up the report, wherein it is emphasised that the function of mass miniature radiography is not so much diagnosis as the sifting out from a number of apparently normal persons those whose condition requires further individual diagnosis by established methods. Apart from tubercle and other affections of the lungs it is hoped that the sets will throw light on cardiac abnormalities; appendix III of the report suggests a new terminology for use in describing these deviations and deserves close attention.

MAINTENANCE ALLOWANCES

The rest of the memos is devoted to a detailed survey of the action to be taken when tuberculosis has been diagnosed, whether by mass radiography or in any other way. Persons who have to leave work temporarily in order to obtain treatment will, it is pointed out, do so much more readily if they can be confident as to the maintenance of those who look to them for support. The allowances (39*s*. for husband and wife, 25*s*.–27*s*. for one person, 5*s*.–12*s*. for dependants) described in the circulars are meant to secure this object. They include provision not only for the period while the patient is unfit for any work but also for the period of gradual restoration to full working capacity—e.g., after successful treatment in a sanatorium, while the patient is able to undertake such limited work as the tuberculosis officer may judge to be suited to his condition. Acting on the advice of a special committee of the Medical Research Council, assistance in respect of which expenditure will be reimbursed by the Exchequer will consist of—

(1) a standard rate of maintenance (described as "maintenance allowances") payable without inquiry into means (beyond inquiry to establish whether the employers are continuing to pay any wages during sickness and, if so, to what extent, the amount of any National Health Insurance benefit payable and the amount of any treatment allowance or disability pension or pension allowances received from the Ministry of Pensions) to which will be added actual rent and rates up to a maximum of 15*s*. per week;

(2) additional payments (described as "discretionary allowances") at the discretion of the authority and after need has been established, towards meeting exceptional commitments, in the way of charges incurred for high rent, mortgage, education, insurance, hire purchase or the like, which were not unreasonably incurred before the need for treatment was known but which cannot be met unless some additional grant is made;

(3) other additional payments (described as "special payments") at the discretion of the authority and after need has been established, for (*a*) reasonable travelling expenses incurred by near relatives where the medical superintendent certifies that a special visit should be paid; or otherwise at such intervals as the tuberculosis officer considers reasonable; (*b*) where the person undertaking treatment is the housewife and increased expenditure is involved in obtaining domestic help from outside the household in her absence, for a special payment not exceeding 10*s*. a week; (*c*) in the case of persons without dependants where the payments cannot be met out of NHI benefit and any other available sources of income, for a reasonable allowance not exceeding 5*s*. a week for pocket-money for patients while undertaking approved treatment in an institution and an allowance in respect of continuing commitments for rent, rates, insurance or hire purchase charges.

The persons who have been primarily in mind for the purpose of these arrangements are persons gainfully occupied and with dependants whose source of income necessarily ceases when treatment is undertaken. Allowances in such cases will be payable on condition that the treatment undertaken is approved by the authority, whether this treatment is in an institution or not. Where the patient is in an institution the maintenance allowance will be subject to a deduction of 10*s*. per week to meet the saving due to residence in the institution.

PART-TIME EMPLOYMENT

As the committee of the Medical Research Council point out, re-entry into ordinary full-time employment entails a sharp change from no work at all or from a limited amount of work under sanatorium conditions, and the danger of relapse which this would involve is likely to be enhanced under the stress of war-time working and transport conditions. On the other hand, employment which is timed and calculated to meet the capacity of the individual has great advantages both medical and psychological. Suggestions for rehabilitation were made in the report of the Tomlinson Committee, but pending the time when they can be brought into effect, assistance should be made available for persons suffering from tuberculosis who undertake employment approved by the authority as a part of their treatment. Provision of employment is to be considered as part of the complete treatment for which Exchequer assistance is available. The Minister of Labour, the British Employers Confederation and the Trades Union Congress, have been consulted with a view to facilitating arrangements for employment, and the local officer of the Ministry is to be consulted at the stage when the individual is adjudged by the tuberculosis officer to be fit for a measure of controlled employment, the local officer being informed of the amount and type of work which the individual ought to undertake. The authority should be able to enlist the sympathy and support of local employers and may often be able to find employment in their own service. For this purpose it will generally be advisable to establish a small informal committee consisting of representatives of the local authority, the Ministry of Labour, of employers and employed, and this suggestion has the support of the Employers Confederation and the TUC. The kind and amount of work undertaken should be approved by the tuberculosis officer as appropriate to the medical needs of the individual. As between employer and employed the rate of payment should be in accordance with recognised rates and conditions, allowance being made if necessary for the reduced amount of work appropriate to the medical condition of the individual. Considerable elasticity will be required to make arrangements appropriate to the medical needs of individuals, but with goodwill and coöperation practical

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solutions should readily be found which will be fair to both parties. It has been agreed by the Exchequer that one-third of net earnings on part-time employment may be ignored in calculating the allowances to be paid after part-time employment is undertaken.

SCOTLAND

GREAT GIFT TO EDINBURGH UNIVERSITY

Sir Donald Pollock, MD, lord rector of Edinburgh University, has given a trust fund of about a quarter of a million pounds to stimulate and develop student activities in the university. The trustees of the fund will be advised by a committee representative of various university interests and they intend to plan on two lines —the establishment of residences where students may enjoy the interests and advantages of community dwelling, and the provision of other facilities, such as club-rooms, gymnasium, swimming-baths, and garage, ancillary to a happy and satisfactory undergraduate life.

The first of these plans suggests a break with the traditional custom by which the average Scottish student lives in " digs." This custom is attributed by some to a deep-rooted and indigenous instinct. Others put it down to the need in many cases for simple living and cheap lodgings. In this respect the situation is altering: many sources of financial support are now available for those who have the ability and the ambition to benefit from a university education. Or it may be that the national spirit is changing, and that collectivism is replacing individuality.

Whatever the reason, there is a growing demand among students for opportunities for closer contact between the great variety of interests represented in the university. A step in this direction was taken at Edinburgh nearly fifty years ago, when the late Professor Geddes headed a movement for the formation of university halls. The idea met with support and four residences accommodating some 150 students were established in the Old Town near the university, and they have never lacked their full complement of residents. Sir Donald Pollock's generosity will thus allow us to extend a principle which has already been accepted and privileges which hitherto have been available to the few will be open to the many. When the scheme is in full swing, it may be possible for most students, if they so desire, to enjoy during part of their course the stimulus of community life. The houses chosen for the new venture lie between the King's Park and Dalkeith Road, and are ideal in situation and internal arrangements. The details of the scheme have yet to be considered, but if the future develops upon the lines intended, Edinburgh undergraduates will enjoy intellectual and material opportunities which will increase the value and enjoyment of their academic careers. It may be, indeed, that these developments will initiate revolutionary changes in the life of the students.

Students of Scottish universities elect every three years a lord rector. He is their representative in university administration, and in virtue of his office president of the university court, which administers in large measure the corporate life of the university. This election is democracy in the real sense, for the nominee of the student body occupies an influential place in the higher administrative circle. Sir Donald has made good use of his opportunity, and his gift is a magnificent testimony of a lord rector's interest in the welfare and happiness of his constituents—who, by the way, rejoice at his escape from injury in a road accident.

A PLAN FOR THE UNDER-FIVES

THERE are about 3 million children under five years old in the United Kingdom. Although more than 1200 war-time nurseries have been established to meet the needs of women employed in industry, only about 2% of these children are accommodated in approved nurseries and nursery schools. Major C. H. Nathan, as chairman of council of the National Society of Children's Nurseries, has prepared a plan [1] to provide nurseries for 300,000 children, in four years after a transition stage of one year from the end of hostilities. Two groups of children would be catered for:

(*a*) Those for whom full-time nurseries are necessary because their mothers go out to work or for other specific reasons. Nurseries for such children would require to be open for 5½ days a week, 9 hours a day and for 52 weeks a year.

(*b*) Other children requiring a nursery open 7 hours a day for, say, 48 weeks a year.

The cost of the first type is estimated at 3*s*. 6*d*. and of the second at 3*s*, a day, the parents to pay 1*s*. towards the cost in both cases.

In favour of the scheme it is pointed out that for several years past about 16% of school entrants have been found to be suffering from some physical defect which could usually have been prevented by better living conditions, proper medical supervision, more knowledge and leisure to apply it. Provision of nurseries is urged not only for the welfare of young children but also to help relieve mothers from

" the almost unbearable strain which is imposed on women who have the care of two or more healthy children under school age, and at the same time have to run the home, do the shopping, cook, clean, wash and mend, and look after their husbands; and this for seven days a week and fifty-two weeks in a year."

A working mother, it is pointed out, cannot be unwell; she can only be seriously ill; and the scheme includes a proportion of cots to enable children to be accommodated when the mother is confined or ill, or when for any reason a child must be temporarily away from home, and no residential nursery is available.

Mr. Nathan regards a " charter for working mothers " as essential, and by providing nurseries would enable them to have a regular weekly holiday. He also recommends the establishment of mothercraft centres, where mothers, actual and potential, and students may receive training in the care of young children.

Nurseries at present being run under the welfare authority are usually staffed by a state-registered nurse as matron, with a trained deputy, supplemented by nursery nurses and by students who take a definite course of training for which a diploma is granted. There has been some criticism of the employment of registered nurses as heads of nurseries, but Mr. Nathan believes that their training renders them invaluable in preventing spread of infection by early recognition of symptoms of illness.

The scheme, it is admitted, would not be cheap, but it is thought that the expenditure would be more than offset by reduced cost of hospital and medical services, apart from the advantages to the children and their parents of improved health and general well-being.

1. A Four Year Plan for Children's Nurseries. By the Chairman, National Society of Children's Nurseries, 117, Piccadilly, London, W.1.

TRANSFUSION ACCIDENTS

THE following memorandum has been circulated to EMS hospitals and maternity services throughout this country:—

If following a transfusion the state of any patient gives rise to anxiety and it is felt that the condition can reasonably be ascribed to some effect of the transfusion, it is requested that the incident should be immediately reported by telephone to the nearest blood-supply depot in the London area or regional transfusion laboratory in the provinces, so that any necessary investigations can be initiated at the earliest possible moment. At the same time, the hospital pathologist should be informed.

The conditions which it is particularly desired to investigate are hæmolytic reactions, and reactions due to deterioration or contamination of the blood or blood derivatives used for transfusion. Although these reactions produce very variable clinical pictures it is suggested that the occurrence of any of the following symptoms or signs following transfusion should be notified: sudden grave collapse, acute severe backache, hæmoglobinuria or jaundice. Rigors and febrile reactions should not be notified unless they are accompanied by one or more of the above signs or symptoms.

The investigations in such cases would be made very much easier if a sample of the blood, or blood derivative, from the bottle given was available. It is therefore requested that a few cubic centimetres should be left in every bottle of transfusion fluid given and that this should be kept in the bottle for at least 24 hours, and not thrown away until the patient has been re-visited and it has become clear that he has not

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reacted unfavourably to the transfusion. As a routine, therefore, every bottle should be re-capped after transfusion and put in a cold place (in a refrigerator if possible). The giving apparatus should be removed and washed immediately in cold water as usual.

If for any reason it proves impossible to make immediate contact with transfusion headquarters it is requested that a sample of blood should be withdrawn from the patient under sterile conditions, using a dry syringe if possible, and divided between two dry sterile tubes and one dry oxalate tube (for blood culture and other examinations).

At the same time, a clean specimen of urine should be obtained from the patient and kept.

In the ordinary way these specimens of blood and urine will be collected by the transfusion officer when he arrives to see the case.

MEDICINE AND THE LAW

The Unrecognisable Surgeon

OF all popular abbreviations the initials which indicate medical degrees are among the most familiar. A certain agoraphobic dignity and aloofness forbid the Inland Revenue authorities from recognising them. The *Times* lately published a letter from Sir William Dyke Acland, complaining that, when he had recently to swear an oath as executor of an estate where the documents described a doctor as "FRCS," the probate officials refused to accept this as a sufficient description and insisted upon the words "medical practitioner." Sir William was advised by his solicitors that there was no alternative but to carry out the official wishes strictly. He had to make a journey from the countryside to the town where his lawyers practise, thus wasting time, petrol and tyres. It was necessary for him to swear another oath which, he observes, he has done in more senses than one.

MD and FRCS and the like are recognised abbreviations in the Concise Oxford Dictionary and the usual works of reference. The Medical Act names a fellowship of the Royal College of Surgeons as a qualification of a medical practitioner "recognised by law." The Commissioners of Inland Revenue are authorised to prescribe the forms of affidavits and other statements required in the processes of probate. Their subordinate officials can retard administration until the chosen words of their fancy are substituted, even though every single member of the civil service may be credited with solid knowledge of the meaning of such a description as "FRCS." Let us take warning therefore when framing our testamentary documents. It is probably hopeless to expect officialism to relax its rigidity even in war-time.

Sale of Medicine on Street Stall

The Pharmacy and Medicines Act, 1941, restricting the sale by retail of medicines by unauthorised persons, allowed certain sales in shops. In a recent test case at Leeds the stipendiary magistrate held that, for this purpose, a street stall is not a shop. A board on trestles had been placed in the street outside a covered market. The trader sold a medicine known as "Eaz-u-quick oil" at this stall. The magistrate held that the stall could not by any stretch of the imagination be described as a shop. The use by the defendent of a piece of ground, even if he had the right to use it for an indefinite period and to carry on his business from such a stall, did not constitute a shop. He agreed to state a case for a possible appeal.

In the 1941 Act "shop" is to have the same meaning as in the Shops Act, 1912, where the definition includes "any premises where any retail trade or business is carried on." It was argued for the defendant that "premises" might refer to the whole market at Leeds, and that the stall, being part of the market, could therefore come within the definition of shop. The argument did not succeed. Perhaps the definition in the Shops Act, 1934, is a little wider; "shop" there will cover "the place in or from which the retail trade or business is carried on." In another statutory definition, in the Pawnbrokers Act of 1872, a shop includes "a place of business or place where business is transacted." The legislature was apparently anxious to include pawning transactions carried out in a private dwelling-house.

PAVLOV INSTITUTE IN WAR TIME

(Cable received by the Anglo-Soviet Medical Council)

OWING to the war the Pavlov Physiological Institute has had to leave its Leningrad laboratories and work in a new place, and under new, not always easy, conditions. The basic problems on which it is engaged concern the physiological mechanism of disturbances caused by war injuries, and methods of diagnosing these disturbances accurately, so that rational treatment can be given.

The head of the institute, Academician L. Orbeli, together with one of the senior scientific workers, N. Michelson, is investigating experimentally the conditions which give rise to œdema of the brain and searching for means of preventing it. The work has not yet been completed, but a number of facts have been obtained which show that physiological experiment should provide the key to this problem. A laboratory under the guidance of Prof. G. Gershuny is examining the aural functions of patients who have had brain injuries and has established a fact of great theoretical and practical interest. Patients suffering from injuries to the parietal lobe who retain their sense of hearing lose their ability to locate the direction from which the sound comes. Inability to localise sounds, in a patient who retains his general aural perception, indicates an injury to the parietal lobe of the brain.

Prof. A. Tonkikh is studying the nervous factor in the origin of toxic œdema and pneumonia. In the light of his investigations, these disorders must not be regarded merely as local processes taking place in the lung tissue, but rather as general processes, whose course is to a considerable extent determined by the influence of sympathetic nerves. Tonkikh's observations add new and important material to the study, widespread in the Soviet Union, of the trophic influence of the sympathetic nervous system on tissue processes.

The laboratory under Prof. E. Kreps has made a discovery enabling a new method of diagnosing septic diseases to be worked out—a discovery which has attracted the attention of the medical profession. The struggle against sepsis, and against the spread of infection from the site of injury to distant organs and tissues, is one of the most important tasks confronting medical science in war-time. Kreps noticed that septic infections suppressed in a specific way one of the ferments of the blood corpuscle (a ferment which helps in carrying carbon dioxide with the blood-stream). He made use of this fact to establish a method of early diagnosis of sepsis which can be employed under army hospital conditions. By careful observations it has been established that this method enables the beginning of the septic process to be established earlier than other methods previously in clinical use. In this way the doctor has an earlier opportunity of adopting measures to prevent a spread of the infection.

Prof. A. Ginetsinsky's laboratory is investigating the physiology of mechanisms which lie at the root of contracture after wounds of limbs. Contracture develops when an arm or leg, after an injury, remains for a long time bent. Its cause is an intricate complex of pathological reactions of the central and peripheral nervous systems and muscular tissue. Contracture will not be prevented or treated with full effectiveness until this complex has been analysed by clinical observation and physiological experiment. One of the most interesting laboratory investigations that has so far been carried out deals with one of the components of the contractural complex—namely, atrophy of the injured muscles. It has been shown experimentally that with severe atrophy there is not only paralysis of the nerve controlling the muscular group concerned, but also pathological reflexes arising from stimuli conducted along this nerve. These reflexes destroy muscle and induce overgrowth of connective tissue. This experiment is in complete accord with the clinical observation that contracture does not develop through complete paralysis of the nerve but through an injury causing an inflammatory process which gives rise to prolonged irritation.

Among other investigations which are still being worked on, mention should be made of the many-sided study of the results of wounds of the central nervous

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system. During the early months of the war, an experiment was completed in Leningrad on the training of pilots for high-altitude flying, and experiments were carried out on the preparation 'Benzedrine' (amphetamine) which counteracts fatigue and makes it possible for a person to do without sleep for a long time under the conditions obtaining during flight. Various aspects of problems concerning vitamins are also being studied, and the toxic effect of sulphonamide preparations.

Academician Orbeli, the teacher of the majority of the institute workers, is the inspirer of all our many-sided work. Under his guidance the staff of scientific workers are striving to prove themselves worthy of the honour of bearing the name of the great patriot and scientist Ivan Pavlov which is inscribed on the façade of the Leningrad home of the Physiological Institute of the Academy of Sciences of the USSR.

MEDICAL WOMEN'S FEDERATION

AT a meeting on April 15 Dr. JOSEPHINE BARNES discussed some therapeutic uses of the endocrines in obstetrics and gynæcology. The ovarian hormones are probably responsible for the development of the breasts at puberty and during pregnancy. The same hormones, which are produced in large quantities by the placenta during pregnancy, inhibit the onset of lactation until after parturition. Initiation and maintenance of lactation depend on the anterior pituitary, which is believed to secrete a lactogenic hormone, prolactin. These facts have been applied clinically in two ways: prolactin has been given to lactating women in an attempt to increase the supply of milk, but with disappointing results on the whole; and natural hormones and their synthetic analogues have been used successfully to inhibit lactation. Synthetic œstrogenic substances can also be used for the treatment of engorged breasts; they are not toxic to puerperal women, can be given by mouth, and are not expensive.

Miss M. MOORE WHITE, speaking of the endocrinal treatment of sterility emphasised the importance of investigating both partners in a barren marriage. In about 30–35%, the man shows evidence of faulty spermatogenesis, and in a fair number of marriages both partners show abnormalities which can be corrected. The genital organs can sometimes be stimulated to normal activity by ovarian or testicular hormones; by the gonadotrophic hormones obtained from the pituitary; by the serum of pregnant mares (follicle-stimulating hormone), or by luteinising hormone obtained from human pregnancy urine. Pituitary gonadotrophic hormone, either alone or combined with other hormones, is also given to stimulate general development of the gonads, uterus and fallopian tubes. Follicle-stimulating hormone has been given during the first half of the menstrual cycle to increase follicle development; and in concentrated dosage at the middle of the cycle, to induce ovulation. Luteinising hormone is given when an endometrial biopsy shows insufficient development of the secretory phase. It has been given to patients complaining of sterility who report occasional delayed onset of menstruation (suggesting an early miscarriage) and in cases of threatened abortion. It can also be administered prophylactically to women who have become pregnant and give a history of previous miscarriage.

THE DENTISTS REGISTER for 1943, which has just been published for the Dental Board of the United Kingdom by Constable & Co. (price 15s.), contains 15,192 names. During the year 353 names of new graduates or licentiates were added, being 18 more than in the previous year, and 162 names were removed on evidence of death. But this credit balance cannot be counted on to continue, for like the rest of the community at present the dental population is unduly elderly; soon now the death-rate must rise and blot out the balance unless the entry increases. There is another disturbing factor too, for during the year 205 names of living dentists dropped out of the list for one reason or another, and only 110 were restored. The position is more than a little disquieting for the future if, for the moment, we may be glad of a pool which is 96 up on last year.

In England Now

A Running Commentary by Peripatetic Correspondents

My dear Nephew,—I am glad to hear that the offending appendix has been removed, and that you are well on the way to recovery. I note that you now want to be an anæsthetist when you are older, and would like to know something about the art of anæsthesia.

There are two types of anæsthetist: stationary and peripatetic. The former have all sorts of odd jobs thrust on them; the latter boast that they will deliver gas in plain vans at any hour of the day or night. A gathering of these charming people is known as a snuffle of anæsthetists. You must get out of your head all the classical jokes. "Dr. Jones, surely if the patient can keep awake, you can too?" or "Dr. Smith, my end seems to be awake, how's yours?" may have been applicable once upon a time (although I doubt it, since anæsthetists, like Aberdonians, love to tell stories against themselves), but they are quite inadmissible now that the regiment has become mechanised. The "man half awake, bending over a patient half asleep" is by now a complete myth. When giving a volatile anæsthetic, the modern anæsthetist is like the stoker in an oil-fired liner—having set the taps, all he has to do is to give an occasional glance at the gauges to see that all is well. When he has given a spinal, he is like a country gentleman who, having done a good piece of rough shooting, spends the rest of the day before the library fire or pottering about in the greenhouse.

Anæsthetics can be exhibited by various routes—that is, they can be pushed in through most of the holes in the body. I cannot recall that they are given through the external auditory meatus, though you will remember that Hamlet's father was taken for a ride by this route. The other day I witnessed a brain operation in which the patient was completely covered with cloths and a long tube from the anæsthetic trolley disappeared somewhere in the region of his abdomen. I tell you this to warn you against taking anything for granted in anæsthesia, for the anæsthetic was not being exhibited by the umbilical route. In the old days, when the patient stopped breathing, this was a matter of some importance. If it did not cause alarm and despondency, at least it called for prompt action. But your modern anæsthetist, who has cunningly slipped in an intratracheal tube, is not really happy until he has paralysed the respiratory centre. Only then is the patient bent completely to his will, only then does he rise to the top of his form as serenely, efficiently, contentedly he squeezes the life-giving bag. The number of drugs at the command of the anæsthetist is immense, and growing immenser. In addition, each drug is given several different names by several different firms, which adds to the apparent number. I was once privileged to hear a medical man about to undergo an operation enumerate his wants to the anæsthetist, while Mrs. Beeton's shade nodded smiling approval. The Americans, who are inveterate producers of new anæsthetics, have recently introduced one called "cypreth ether." In this, however, they were forestalled by Shakespeare, who wrote:

> "Fly away, fly away, breath,
> And in sad cypreth let me be laid;
> Come away, come away, death,
> I am slain by a fair cruel maid."

The last two lines have not been properly explained in the commentaries, since it is inconceivable that the poet could have had any doubt about the safety of this anæsthetic in the hands of a female anæsthetist.

If I were given to punning I would summarise thus: It all boils down to this, that despite a swift retreat, thereby averting disaster, the spirit of the old anæsthetists breathes on, and it will be realised in the future that the present generation has not worked entirely in vain. (Yes; you are right; five puns, all weak.)—Your affectionate Uncle George.

* * *

April the 14th, a memorable day, the first walk I'd had with Bunny for six months. Spring had come as a sudden burst of gold through clouds; the cuckoo which we had heard for the first time the day before now seemed elusively everywhere; we saw our first orange-tip and

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many of them. "I don't like the colour of the female brimstone," said Bunny, "it reminds me of the lemon drink they sell in the tuckshop at school—made of chemicals." "Hark," I said, excited, "there's a willow wren!" The day was full of splendid surprises like that. Going down to the marshes we heard in the distance that haunting choral of peewit and redshank. We ought to have wondered why, but didn't. We continued on our golden way, enchanted now in watching that marvel of daintiness, the yellow wagtail. Then we flushed a pair of partridges and they disappeared over a hedge. "Did you hear that cock partridge?" said Bunny, puzzled. I ought to have sensed a tenseness then, but I was drunk with spring. "Look, here's an early purple orchis!" Suddenly, about two hundred yards ahead and flying from left to right, I saw a peregrine; he was carrying something in his claws, but I could not see what. "Ssh," I hissed, and we both sank to the ground. He was behind a ridge of earth from a cleaned-out dyke now, but through the glasses I could see part of him, the wings lifted as though struggling with his victim. I handed the glasses to the boy, who was quivering. We stalked forward. The tiercel rose when we were about 80 yards from him, and we watched his characteristic flight fade away. Bunny found the victim—the cock partridge, with bloody head and broken neck, but otherwise lustrous with spring plumage. That was the zenith of our day—we had seen a great killer at work, and a rare one here. Later, as we lay by the river, after swimming from Sussex to Kent and back (about 15 yards), we saw him again, a splendid arc high up in the blue. The rest of the day is a happy memory of drumming snipe, thick lush grass, and the sun on the marshes. For me there is a savoury to these good things. Bunny is out on the lawn, the partridge in his hands, giving a demonstration, and his voice comes to me through the window. "I heard . . . we crawl up . . . he gets up . . . I find . . . afterwards we saw": the dramatic present tense, the picture-thinker's commentary.

* * *

Our ARP controller and officer i/c First Aid Post is Mr. Simpkins. He is a pearl of great price. I think he was a warrant officer in the Canadian RAMC in the last war—and he must have been a fine prop for any uncertain MO. He is quite imperturbable, and his good humour never deserts him. One peculiarity he has which causes me endless delight. He always opens a conversation with me with the words: "By the way, Doctor." If I pick up the phone and hear the mystic words, I know that next will probably come "there's a young lady down here who's . . ." The climax in the use of this strange introduction came one night about 3 AM when I awoke to hear a soft tapping and a familiar voice say: "By the way, Doctor, there's a young lady out here with a bit of a headache."

* * *

Before the war, we who insure ourselves for medical protection received every year a brochure cataloguing the atrocities of our colleagues. One of the minor tragedies of the war is that we no longer receive these stimulating and cheering pamphlets. Nearly everyone has secret fears of incompetence, and the strengthening effect of reading of doctors who are even more unconscientious and incompetent than ourselves is beyond measure. How eagerly I used to await the little booklet. How enthralled I was to learn of an anonymous villain (euphemistically called "Your Member") and the unbelievable things he had done. Though at times my heart would bleed for the hapless patients of Your Member it would fill with rapture as I thought: "I don't believe even I would have done that!" "Your Member," I would read, "after refusing to see an accident case for a week, when he finally did see the case failed to observe three compound fractures, stating the patient's condition was due to nerves although he was deeply unconscious. When the fractures were pointed out to him he put both elbows in a tight plaster in full flexion. At a later visit both arms were found to be gangrenous, and Your Member, considering there was some inflammation, injected 3 g. of sulphapyridine. This was given subcutaneously and resulted in a considerable degree of sloughing." The story usually ended with the polite summary: "It was decided that Your Member had committed an error of judgment."

That such stories should have tonic properties is quite understandable. The normal person cannot believe he is doing all right unless he knows that someone else is doing all wrong.

* * *

My thirty rabbits are gambolling in their pens on the tennis lawn, the sun is warm, the day a poem of Herrick. I am drowsing in a deck chair, idle fancy and idler thought titivated by the sight of so much homegrown first-class protein. I really must look up the food tables again to verify the surprising fact that rabbit has as much protein as beef steak. If so everyone should be forced by Beveridge, or Uthwatt, or Scott, or preferably of course myself, to keep two breeding does. That means 80 rabbits a year, or 240 lb. of good meat. *And* the grass of the tennis court is kept short.

But the day is too drowsy for practical ideas. It invites the peace-time luxury of errant academic thought. Why have rabbits polyuria? Because all cabbage is water and all rabbit flesh grass. Nonsense. Try again. Why do rabbits wash themselves so carefully? That is an easy one. They scrape the irradiated 7-dehydrocholesterol off their fur and eat it to give themselves vitamin D_3. Probably all furry animals get their vitamin D in this way. If you stop a rat licking itself you cannot cure its rickets by irradiating it. If owls do not eat the fur of their prey they die from lack of vitamin D. Is all one's own vitamin D washed off if one swims after sunbathing? Is the fretfulness of overwashed babies the fretfulness of rickets? Is it less soap rather than more Government cod-liver oil we want? Are children right in hating washing?

The rabbits in one pen are behaving in a most improper manner. Yet I am sure they are all very young bucks. I separated the sheep from the goats both by the lore of the milkman and by the teachings of Starling's physiology. So their behaviour is either vicious, or Freudian, or normal. My mother says schoolmasters and psychologists should keep rabbits; then they might learn some sense over sex in boys' schools. What I say is that rabbits prove coeducation is bad, for unless the sexes are separated at a tender age the bucks fail to thrive. The does, on the other hand, flourish. Does this cast a new light on the different functions of the pituitary in the two sexes, or is it merely another example of women liking men more than men like women?

* * *

I had been a little doubtful about the appointment of the new night sister to the Maternity Department from the beginning, though she was armed with the best qualifications and references. When the case of placenta prævia was admitted I agreed with her that the fœtal heart could not be heard and then turned the presentation to a breech and ruptured the membranes; the bleeding stopped at once and it seemed that all would be well. I told her to supervise the delivery and call me later. But her message on the phone recalled all my doubts. "The third stage is completed, doctor," she said, "and the second stage is about to begin." Had she learnt her midwifery backwards and managed to keep it from her examiners? Was she a secret partaker of drugs which disorientated her arithmetic? I dashed round expecting the worst, but there quite unperturbed she presented me with the placenta in a receiver and the patient still in labour with a prolapsed and pulseless cord. The second stage continued with no bleeding at all, and a stillborn breech was born uneventfully.

* * *

"Sir,—I would be obliged if you would sign the medical report exempting me from firewatching. The manager of our labour exchange is an old enemy of mine. Twelve years ago I knocked six of his teeth down his throat and was fined a fiver for it, so I feel this matter to be a personal issue between him and myself, and if I get upset again I might hurt him more this time. Thanking you. . . ." Letter received by an EMS neurosis centre.

* * *

From an old case-book:—"Mrs. X. c/o rash. Thinks it might be syphilis = flea-bites. 1*s.* 6*d.* Pd." Thus are the great decisions, and the big money, made.

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Letters to the Editor

THE SPECIAL CENTRE

SIR,—In his letter of April 17 Dr. Neligan appears to be satisfied that the establishment of special centres for rheumatism would result in benefit both to patients and to the progress of our knowledge of the subject; and Dr. Osman feels the same about special centres for renal diseases. This assumption raises a question of principle of more general application. What is the value and place of centres for special treatment in any reorganisation of our hospitals after the war? It will not be contested that special centres for well-defined conditions do achieve a high standard of treatment and sometimes advance research in their specialty. I would include in this category diseases of the special senses, but I am doubtful if the list should be extended much further, except in so far as is necessary on account of considerations of infection. If the subject matter of the specialty is not easily recognised by patient and practitioner, I would submit that efficiency in treatment and research is handicapped in isolated units. The label rheumatism is applied by the public and by many doctors to a parcel of conditions of widely different ætiology and prognosis. For effective treatment, in addition to the requirements set forth by Mr. Capener on April 3, accurate diagnosis is the first essential. This often demands opinions from clinicians concerned with many branches of medicine and investigations by pathologist and biochemist. Such a wealth of knowledge cannot be readily available at a special hospital. The same conditions rule the organisation of research into a complicated problem. I would suggest that the progress of medicine will be best served by the establishment of specialties within the organisation of a large general hospital. This will secure the coöperation of all services at a high standard and tend to prevent the splitting up of medicine into watertight compartments.

Cambridge. C. MAX PAGE.

SPECIAL HOSPITALS FOR RHEUMATISM

SIR,—On behalf of the Heberden Society we welcome the letter from Mr. Norman Capener in your issue of April 3. His use of the term orthopædics, and orthopædists in place of orthopædic surgeons, makes clear the desire which we all feel for closer collaboration between medicine, surgery and preventive medicine in the study of the causes, treatment and as far as possible prevention of the manifold morbid conditions which are grouped under the heading of the rheumatic diseases. With full collaboration the chances of success will be infinitely greater. In the past there have been far too few orthopædists in hospitals chiefly concerned with rheumatism, and perhaps too few physicians associated with hospitals mainly devoted to the surgical side of orthopædics, and progress has been slow in consequence. We refrained from an earlier reply in case there should have been further correspondence on the subject which might have been dealt with at the same time. Dr. Neligan's letter has dealt adequately with some of the details of the subject, and we need not trespass further on your space.

CHARLES W. BUCKLEY, KENNETH STONE,
MATTHEW B. RAY, C. B. HEALD,
ERNEST FLETCHER, DRURY PENNINGTON.

Mayfair, W.1.

AVOIDANCE OF POSTPARTUM HÆMORRHAGE

SIR,—Mr. Reddington regards chloroform as the greatest single cause of postpartum hæmorrhage and says "The only possible anæsthetic for a forceps delivery is gas and oxygen." I should have said that the pre-eminence of gas and oxygen was by no means proven. The great objection to its use is that a cumbersome apparatus, rarely available in private houses and often unobtainable in nursing-homes, is necessary. This precludes it from being employed as a routine in ordinary midwifery practice. I maintain that for general purposes a light ether anæsthetic is safe and in most instances is the method of choice. In your leading article of April 10 which Mr. Reddington criticises you make it clear that chloroform should only be used in the induction. The two or three drachms of chloroform used for induction, if properly administered, surely do not cause hæmorrhage. Mr. Reddington then quarrels with your advocacy of the injection of pituitary extract after forceps deliveries before the expulsion of the placenta. He considers this procedure Edwardian and draws attention to the dangers of pituitary shock and contraction of the cervix. Pituitary shock does of course occur but is extremely rare. Contraction of the cervix is not so rare but is never severe enough to cause much difficulty in the unlikely contingency of a manual removal becoming necessary. Hæmorrhage, however, is by no means uncommon. Its incidence is reduced if pituitary extract is injected. Surely it is justifiable to run a small risk in order to obviate a larger one? During the past 2½ years I have injected pituitary extract before the expulsion of the placenta in some 200 forceps deliveries and have noted no untoward results. It is comforting for us Neo-Edwardians to have no less an authority than Joseph B. De Lee of Chicago in our ranks.

Manchester. C. E. B. RICKARDS.

SIR,—I read with interest your stimulating leader of April 10. The importance of knowing the patient's hæmoglobin figure might, I think, be stressed. Since the beginning of this year I have had hæmoglobin estimations done on all patients attending my antenatal clinic at Leeds Maternity Hospital. This has had the object of preventing patients reaching labour with a low hæmoglobin; if they do so, sometimes quite a normal loss may render them collapsed and in need of resuscitation. I am sure you are right in emphasising that if the placenta is to be removed by the hand it should be done early, before the patient has had serious hæmorrhage. In our teaching the risks of manual removal tend to be over-estimated; the great danger is in performing the operation too late—i.e., on a collapsed patient.

At Leeds D. W. Currie (*Lancet*, 1932, i, 1087) found that the Mojon-Gabaston (note the spelling) method of injecting the umbilical vein was a safe and useful procedure in the treatment of postpartum hæmorrhage. The technique is simple, and even if it fails little time or blood has been lost; frequently the increase in placental bulk stimulates immediate uterine contraction.

Since the beginning of 1939 40 cases of placenta prævia have been treated at this hospital by cæsarean section: of these 3 underwent blood transfusion before, and 4 at variable times after the operation. None of them developed paralytic ileus. Three other patients transfused before cæsarean section had no trouble. The only case of ileus I have seen after cæsarean section received no blood transfusion at any time.

I agree with Mr. Reddington in disapproving of chloroform for the forceps operation. One of the best combinations when available is nitrous oxide, oxygen and ether. Several American writers in the last few years have stressed the risk to the baby of using high concentrations of nitrous oxide (85 to 15 or stronger); they cause serious anoxæmia. As you state, it is important to give the minimum of anæsthetic.

G. W. Blomfield of Leeds investigated the third stage in over 1000 cases receiving 1 c.cm. of pituitary extract immediately after delivery, and in over 1000 controls who received none (*Brit. med. J.* 1938, ii, 1083). There was a loss of over 500 c.cm. in 8·6% of those receiving pituitary, and in 12·5% of those not receiving it—that is, the results were rather better in those treated with pituitary. The average loss per patient was 72 c.cm. more in the control cases. Retained placenta occurred in 1·8% of the control series, and in 2·1% of the pituitary series. Pituitary shock was not encountered. Our conclusion was that while the administration of pituitary in these circumstances did little harm, it also did little good. The practice is recommended by J. B. De Lee (Principles and Practice of Obstetrics, Philadelphia, 1933, p. 137) and E. A. Schumann (Textbook of Obstetrics, Philadelphia, 1937, p. 470).

Leeds. ANDREW M. CLAYE.

TEMPERATURE TAKING

SIR,—History repeats itself. It is well over a quarter of a century since I many times and oft heard that greatest of all masters of the Rotunda teach "Boy, leave a half-minute in for two minutes, and a two-minute one in for five." Hastings Tweedy is happily still with us.

Norwich. JAS.

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MYTHOLOGY OF CANCER RESEARCH

SIR,—In his lengthy reply (*Lancet*, April 24) to my paper "A Contribution to the Mythology of Cancer Research" (*Lancet*, Dec. 26) Dr. Hueper accuses me of, among other things, "prejudice and perversion" in relation to the statements of Dr. Paris, and of "manipulation" of the evidence relating to arsenic cancer in deer. I do not intend to trouble about these charges, as the facts of the subject are available in my paper to anyone who is interested in them. I find that, to deal with even a portion of the matters, largely irrelevant, which Dr. Hueper raises, requires a paper, of which I have a draft at hand, almost as long as his own. I propose to deal with the matter very shortly here.

We are concerned with the alleged occurrence of arsenic cancer in horses, deer, and sheep. In regard to the very dubious evidence of arsenic cancer in sheep, Dr. Hueper admits a "deplorable mistake" and "a garbled version" of Nieberle's paper, so we need not pursue this part of the subject. Dr. Hueper has made the quite definite statement, in a journal devoted to cancer research (*Cancer Research*, 1942, 2, 559), that ". . . arsenic cancer has a relatively long latent period, usually surpassing that of the average life span of the species used in such experiments. This contention is supported by the observation that animals with a much longer life span (horses, sheep, deer) have developed an environmental type of arsenic carcinoma of the skin or of the nasal mucous membranes."

Cancer research workers are entitled to ask Dr. Hueper to state (a) *all* the evidence that arsenic has produced cancer (excluding warts, whether called "precancerous" or not, and all irrelevant pathological conditions) in deer; and (b) any evidence that arsenic has produced cancer in horses, or in a single horse.

London, S.W.3. E. L. KENNAWAY.

PREFRONTAL LEUCOTOMY

SIR,—While endorsing every word of Mr. McKissock's reply to Dr. Winnicott's letter of April 10, there are one or two further points in that letter which should not go unchallenged. Dr. Winnicott seems to be entering a plea for the abandonment of all empirical treatment in the psychoses, until such time as the ætiology of these conditions is firmly established. Such an argument, carried to its logical conclusion, would presumably bar psycho-analysis equally with shock-treatments and the brutal methods of the surgeon, to say nothing of malarial treatment of GPI. Is Dr. Winnicott aware of the many hours of misery saved already to thousands of depressives by electric convulsion therapy? This surely is something to set against the hypothecated damage to the sacred brain tissues postulated by opponents of the treatment. In spite of this dreadful warning, I hope that psychiatrists will give their depressive patients the chance of even a partial recovery by our present unpleasant empirical methods, secure in the knowledge that the alternative is a 90 per cent. chance (if not more) of progressive deterioration or crippling mental incapacity.

St. Bernard's Hospital, Southall. J. B. S. LEWIS.

KNOWLEDGE OF VENEREAL DISEASE

SIR,—I see almost daily women who, before their admission to prison, were receiving treatment for venereal disease. They have attended clinics, hospitals or private practitioners for regular treatment, but in spite of this an appreciable number have no idea of the nature of their illness, and when told at the prison that they have gonorrhœa or syphilis are genuinely surprised and distressed. They may have been told they have "a disease," but many of them fail to understand this euphemism. Some have not even been told of the danger of infecting others on sexual intercourse. Considering the profession of some of these women this is a serious omission.

I do not think it is generally realised by doctors how ignorant are women, even of the criminal classes, about venereal disease. I have known colleagues assume that if a girl knows enough to catch gonorrhœa she also knows what she has got and all about it, and no explanations are necessary. Discussing the matter with a surgeon in a military hospital, he admitted that cowardice sometimes made him omit to tell even male patients that they were infected. "Quite frankly, I haven't always the courage to tell a chap his arthritis is due to gonorrhœa." This attitude seems to be very general and in civilian life, where there is no compulsion to complete treatment, the doctor who neglects, through prudery or shyness, to make absolutely certain that his patient knows the nature, dangers and name of his or her illness bears some responsibility for the spread of venereal infection.

Highgate Road, N.W.5. CHARITY TAYLOR.

ANÆSTHESIA WITH THE OXFORD VAPORISER

SIR,—The Oxford vaporiser was described nearly two years ago (*Lancet*, 1941, ii, 62) and it is surprising that this easily managed machine has not become more widely known. Its purpose is to administer anæsthesia without the use of gas-and-oxygen cylinders.

Through the generosity of Lord Nuffield, on the recommendation of Air-Commodore Macintosh, one of these vaporisers has been placed at our disposal at the Wellhouse Hospital, Barnet. Some medical students from the Royal Free gave most of the anæsthetics and I am indebted to them for their help. The anæsthetic agent placed in the machine may either be ether or a trichlorethylene mixture ('Trilene' 25%, ether 75%). We had a stock of 'Vinesthene'-ether mixture and found this gave excellent results; but Professor Macintosh did not approve of it, owing to the low boiling-point of vinesthene, and for the moment we have discontinued its use. We hope, however, to continue our investigations.

Premedication.—We have used hyoscine compound A (morphia gr. 1/6, atropine gr. 1/100, hyoscine gr. 1/100), given 1½ hours before operation for most of our cases, but I do not think morphia or its substitutes suitable for a technique which depends for its success on inspiring air over ether. On two occasions we found respiration so depressed that we had to use the bellows throughout the operation. Potassium bromide and chloral, āā gr. 30 for adults, seems satisfactory, given two hours before operation (Duncan's 'Canidia' is a convenient preparation). Barbiturates were not used.

Induction can be carried out with ethyl chloride by means of a special bag fitted to the machine or straight from the machine. When ether alone is used in the container ethyl chloride is a great help, but when we use trichlorethylene-ether mixture the ethyl chloride is not needed.

With ethyl chloride, one short spurt per breath is injected into the bag until the breathing becomes automatic. The bag is then turned off and the indicator placed at 10 on the machine. The great point about ethyl-chloride induction is to observe this rule—one spurt per breath—and never add more ethyl chloride if the patient holds his breath. After a few minutes the indicator can be raised or lowered, according to the resistance of the patient and the depth of anæsthesia required. Induction was carefully timed and it was found that the patient was ready for operation in 3–10 minutes. We never failed to obtain absolute relaxation of all muscles within 12 minutes.

When the trichlorethylene-ether mixture was used the facepiece was placed on the patient's face and the indicator moved up one notch every two breaths until "all out" was reached. When relaxation was obtained the indicator was moved back to 10, which seemed to maintain good relaxation in most cases. For minor operations the indicator usually need not pass 10. The time of induction seemed to be about 8 minutes and was never more than 12.

Maintenance of Anæsthesia.—The margin between light and strong anæsthetic vapour is so wide with this machine that when anæsthesia becomes too light there is no difficulty in deepening it without any straining and coughing. The average consumption of ether or mixture was about 5 ounces per hour. For cases where relaxation was not required, very light anæsthesia could be maintained without coughing: this closely resembled gas-oxygen anæsthesia.

Certain points in the maintenance are important:—

(1) The percentage of ether or ether mixture must be reduced as the patient's resistance diminishes.

(2) An airtight and well-fitting facepiece is required.

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(3) With endotracheal anæsthesia a large tube should be used and care should be taken that there are no air leaks round the tube. A laryngeal pack may be needed.

We did not concern ourselves much with keeping the container at the right heat. It was placed under a slowly running hot-water tap for a few minutes before starting the list, but the water was not changed during the afternoon. Our lists are long, but we usually start with the big cases and tail off towards the end to cases not requiring relaxation.

Conclusions.—In a series of 104 miscellaneous operations on patients ranging in age from 6 months to 75 years we found that induction was shorter than with a standard Boyle's machine; that good relaxation was obtained when required; that very light anæsthesia could be maintained with ease; that vomiting after the operation was not distressing and the patients rapidly regained consciousness; and that the technique was safe for nurses or students to use under supervision. These conclusions are based on our own observations, on the quietness and good temper of the surgeons, on the patients' opinions, and on the opinions of the ward sisters. (Why don't our medical journals publish articles by the nursing profession? What a lot they could teach us!).

Another Oxford vaporiser was kindly given by Lord Nuffield to the British Hospital for Mothers and Babies, Woolwich. From experience in the two hospitals I consider the machine most valuable for the general-practitioner anæsthetist or for the many men and women who practise in places where complicated apparatus can be neither obtained nor used. Perhaps I should mention that the wooden box in which it is housed reduces its portability. A good light fibre case would be an improvement.

New Barnet. JOHN ELAM.

EXPERIMENTAL NECROSIS OF ISLET CELLS

SIR,—The paper in your issue of April 17 by Prof. Shaw Dunn and his colleagues describing specific necrosis in the islets of Langerhans from alloxan and associated changes in the blood-sugar is most exciting to those interested in carbohydrate metabolism and they are to be congratulated on establishing this important new fact. In discussing the mechanism of the metabolic changes they are in difficult waters and it seems unlikely that, as suggested, early hyper- and later hypo-glycæmia could be produced by early stimulation and late exhaustive necrosis of islet cells. I should think such blood-sugar changes are more likely due to toxic and prelethal effects on the liver and general sugar metabolism than on insulin production; somewhat similar metabolic states have been produced in the rabbit by other agents. Freezing rabbits causes hyperglycæmia and hypothermia before death, and diphtheria toxin causes a prelethal hyperglycæmia uncontrollable by insulin. I do not think the islet changes in such conditions have been studied, but they are pertinent and should be known before it can be decided whether the thermic and sugar changes described by Shaw Dunn can be ascribed specifically to islet changes rather than to a toxic prelethal state. A simultaneous study of liver glycogen would also be important, but this is probably asking too much—in war-time.

Harley Street, W.1. R. D. LAWRENCE.

STATUS OF HOUSE-OFFICERS

SIR,—I was pleased to note in your issue of April 3 that a peripatetic correspondent on page 441 had given a passing thought to the resident house-officer; I implore him not to let the matter rest. The poor conditions of the nursing staffs of hospitals have been much publicised and recently improved, but housemen exist under equally bad if not worse conditions. Their status as a whole is deplorable considering that they have spent 5½ years in qualifying. Few earn £200 a year and most much less. Their off-duty time for a week is not more than 48 hours, which makes their pay roughly 9*d.* an hour—rather less than an unskilled labourer earns. Admittedly a houseman does not actually work all the time he is on duty, but though he may be eating or sleeping he must be on the spot and ready at a moment's notice. He has to get up in the small hours with all his wits about him and be prepared to bear the full responsibility of a registered medical practitioner. Surely this is worth more than 9*d.* an hour? His health too often is left to take care of itself and only his youth enables him to stand the strain. Regular nights off duty to ensure a full night's sleep, good food (usually his grumbles are ignored) and regular medical overhauls with perhaps sunlight therapy through the winter would help him to cope with the physical and mental strain. Were hospitals to regard their housemen more as doctors I think both housemen and hospitals would benefit.

N. R. E. FENDALL.

FRACTURED SCAPHOID

SIR,—In your annotation of April 3 (p. 437) on the recent meeting of the British Orthopædic Association it is stated that I urged that the plaster applied for fractured scaphoid should be continued above the elbow. This was not my remark, nor do I think it necessary. To clarify this and a misleading statement regarding reduction, I wish to draw attention to the treatment for this fracture which I advocate as a primary measure.

Under general anæsthesia, the wrist is manipulated so as to compress the fracture line or cause slight impaction of the fragments. The hand is then held by an assistant with the wrist dorsiflexed 45° and drawn over to the radial side as far as possible. In addition, the hand is rotated so that the second metacarpal bone appears more dorsiflexed than the fifth metacarpal—i.e., the second metacarpal head is nearer the radius than the fifth head is to the ulna. The assistant grasps the end of the abducted thumb in one hand and the four fingers in the other to maintain the position. Plaster is applied from below the elbow-joint to the necks of the inner four metacarpal bones, but the whole of the thumb is included. The most distal part of the plaster is placed so that the inner four metacarpo-phalangeal joints can be moved. The band between thumb and first finger should fit snugly round the second metacarpal neck—not round the joint just distal to it—and should not be moulded right into the web between thumb and index finger. The length of time this plaster should be retained depends on a number of circumstances. Soldiers, unfortunately, allow these splints to become sodden after a short time. As it is reported from some military clinics that a change of plaster becomes necessary every two weeks, insufficient support during the change of plaster and unnecessary X-ray examination are likely to disturb the normal process of union.

Aldershot. ST. J. D. BUXTON.

USE OF CURARE FOR DIRECT ORAL INTUBATION

SIR,—Is not modern anæsthesia getting out of hand? We read with considerable alarm, in your issue of April 10, the experiences of Dr. Helen Barnes after receiving an intravenous injection of 4·4 c.cm. of 'Intocostrin' (Squibb), and with no little relief of the survival of four patients after receiving a larger dose (5 c.cm.) intravenously, on top of "nitrous oxide and oxygen, ether, or 'Pentothal,'" and laryngeal anæsthesia with 10% cocaine.

Intratracheal anæsthesia is probably the greatest advance in the science of anæsthesia since the discovery of ether by Morton. But the technique is difficult and a job for the expert, who can and frequently does introduce a laryngeal tube without savaging the larynx and without the aid of toxic drugs. It would be regrettable if the less experienced anæsthetist were tempted to resort to the use of what appears to be a dangerous drug to facilitate a manœuvre that only extreme gentleness and patience, coupled with a thorough knowledge of the anatomy and physiology of the larynx, can encompass successfully without gross and unwarranted damage to the patient.

Thoracic Unit, Kewstoke Hospital. MITA BARNES.

FACULTY OF RADIOLOGISTS.—On Saturday, May 22, at 11 AM, at 1, Wimpole Street, London, W.1, Prof. B. W. Windeyer will deliver the Skinner lecture to the faculty. He will speak on malignant tumours of the upper jaw.

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Obituary

WARRINGTON YORKE

MD LPOOL, FRCP, FRS

Professor Yorke, who had held since 1929 the Alfred Jones chair of tropical medicine in Liverpool University, died on April 24 at the age of 60. "Cut off in his prime" is how it strikes those who knew him best and came under the influence of his vigorous intellect and forceful personality. For forty years he had been associated with the Liverpool School of Tropical Medicine as student, research worker or director, and it will be no easy task for the future historian to place in a true perspective the work which he accomplished. He was not that eminently satisfactory type for the historian—the specialist in a very restricted field. For such the niche is always ready, neat, compact, with a definite all-sufficing label, often of modest scope. Not so with Yorke. Who can say which of his many investigations is that on which his scientific reputation will most surely rest? There is his classical work on the pathology of blackwater fever, commenced in Nyasaland and continued in the Runcorn laboratory. There is his successful research into Rhodesian sleeping-sickness and the transmission of *Trypanosoma rhodesiense*. Again, we have his work on the West African Commission which discovered the breeding places of *Glossina palpalis* and proved that domestic cattle were a reservoir of *T. gambiense* in West Africa, as Bruce had shown them to be in East Africa. There are his numerous original investigations on malaria and amœbic dysentery, and his great work with Maplestone on nematodes.

Which of all these will finally appear to be his major contribution to the advance of tropical medicine must await the unhurried answer of time. But there is one question which may well be asked now, and with profit, since an answer to it can be attempted. How was it possible for a man to undertake investigations of this scope and variety and to carry them through with uniform success? The secret of Yorke's scientific accomplishment lay in his adaptability, and this in turn was due in no small measure to the character of his preliminary training. He had a thorough schooling; he early acquired a practical grounding in laboratory technique, and he applied himself with consuming energy to mastering the methods of experimental research. His mind was seldom attracted to, and never long distracted by, fanciful explanations of scientific phenomena. Thus equipped he was enabled to proceed confidently along his selected line of investigation. Take his discovery of a special method of keeping trypanosomes alive in vitro. It was this technical achievement—simple enough now, when everyone has learned from him how to do it—which formed the basis of the whole of his subsequent work on drug-resistance in parasites, and which led to the discovery of chemotherapeutic agents in tropical diseases.

Warrington Yorke was born at Lancaster on April 11, 1883, the son of a Methodist minister, the Rev. H. Lefroy Yorke. He was educated at Liverpool University where he qualified in 1905, and held house-appointments at the Royal Infirmary. In the following year he was elected to the Holt fellowship in physiology and soon after joined Wakelin Barratt in the 19th expedition of the Tropical School to study the blackwater fever in Nyasaland. On his return he became research assistant to the Runcorn Research Laboratory and its director in 1909. From 1911 to 1912 he was a member of the BSA Co's sleeping-sickness commission to Rhodesia, returning to succeed Ronald Ross as Walter Myers professor of parasitology. In 1914 he accompanied D. B. Blacklock on the 32nd expedition to study sleeping-sickness in Sierra Leone. During the last war, with the rank of captain RAMC, he was physician to the Auxiliary Military Hospital of the Tropical School, working on malaria, dysentery and equine strongyloidosis. In 1925 he was awarded the Chalmers memorial gold medal and in 1932 he was elected FRS. Later he served on the MRC chemotherapy committee and on the League of Nations malaria committee. In recent years he was in frequent consultation with the Colonial Office and his strength was severely tried by a prolonged aerial tour in America last winter. He is survived by his wife, née Elsie Greening, a son who is now a prisoner in Japanese hands and a daughter.

CONSTANTINE LAMBRINUDI

BA CAMB, FRCS

ORTHOPÆDIC surgery at large and Guy's Hospital in particular have suffered grievous loss in the death on April 21 of Mr. Lambrinudi at the age of 53. His father, Leonidas Lambrinudi, left Smyrna as a young man to become a stockbroker in London, where Constantine was born in 1890. Never physically robust he was educated privately before entering Christ's College, Cambridge, from which he went on to Guy's in 1910.

Hugh Cecil

His studies were twice interrupted by service for his homeland, first in a Red Cross unit in the Greco-Bulgar campaign and then as an unqualified doctor in the Greek army. After qualifying MRCS in 1914 he was house-surgeon to Fagge and Fripp before joining the army of Venizelos. Towards the end of the war he came back from the East to become a medical officer in the Air Force. On his return to Guy's he took the FRCS, and was orthopædic registrar, until appointed assistant surgeon in 1928. Six years later he succeeded Trethowan as orthopædic surgeon. Trethowan was the master, largely the inventor, of major orthopædic procedures; Lambrinudi, the physiologist at heart, chiefly interested in errors of function and in working out their cause and correction. To him the operation was an incident, the postoperative treatment (which he personally directed) all-important. Present-day views on the mechanism of the foot are influenced by his work, and his name will be remembered by his drop-foot operation, his treatment of claw toes by arthrodesis, and his operation for the elevated first metatarsal in combination with hallux rigidus. His last work, which became a passion, was to solve and bring home to the responsible authorities the cause of foot strain in the Army And this was but a part of an urge to ensure "the hygiene of the tramp to work" which took hold of him. This is how he impressed one of his house-men:

"To work with Lambrinudi was a privilege, an education and an entertainment, and to be on his firm meant using one's brains. Most of us acquire our knowledge from what we are taught, and by learning from the experiences of ourselves and others; but Lambrinudi was different, he was a creator, and probably produced more original work than any of his contemporaries. His writings were many and varied and embraced a number of orthopædic subjects. A keen advocate of correct posture, it was he who first pointed out the connexion between short ham-strings and adolescent kyphosis. A past president of the orthopædic section, RSM, and a member of the British Orthopædic Association, he was regular in his attendance at their gatherings, and never hesitated to express his views, which were often revolutionary but always worth listening to. As a clinician his opinion was invaluable, for he studied every problem from the patient's point of view. He did not claim to be a great teacher; his ideas were too fluid for that. But as a trainer of orthopædic surgeons he was supreme; his registrars have made their mark, and he was filled with delight and pride at their success. To be in his company was a stimulating experience; one was assured of hearing new ideas, maybe fantastic at first sight, but based on sound physiology, and generally proving to be right in the long run. With his insight into human nature, his kindness, his quick brain, and his sense of humour, he was on the best of terms with his patients, many of whom developed a real affection for him."

His health, following a grave illness ten years ago, had not been good, but characteristically he chose to ignore such things as intermittent claudication and attacks of angina, and to live as normal a life as possible; and in this he was helped by the care and courage of his wife. His home life among his family was happy and

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simple; here he was able to relax and rest, to read good literature and to ponder over orthopædic problems. His profession was also his hobby, and it was in the comfort of his chair that many of his inspirations came to him. On the last day of his life he went through a full operating list, and held a large clinic at which he was at the top of his form. He died without premonition in his sleep.

Parliament

FROM THE PRESS GALLERY

The Sailor Nurse

At the third reading of the Nurses Bill in the House of Lords on April 21 Lord KEYES, supported by Lord CHATFIELD, made a plea on behalf of the naval pensioners who had served as sick-berth attendants.[1] Lord Keyes said he understood that under the Bill these men would be classified as "assistant nurses" which would prejudice their chances of employment in civil life. They felt very strongly that by their long service in naval hospitals and the sick-bays of ships and their experience and qualifications they were entitled to the designation of "state registered nurses." Lord SNELL promised to bring the matter to the notice of the Minister of Health.

Medical Treatment for Service Dependants

In the House of Commons on April 22 Mr. G. BUCHANAN and other members raised the question of medical treatment for service men's dependants. Mr. W. PALING, parliamentary secretary to the Ministry of Pensions, said that arrangements had been made by his department some time ago to meet bills for medical attention to these people from £2 to £10. He quite understood that the rule that bills below £2 could not be paid was sometimes a hardship, but the department felt that they must fix a minimum. If they were to pay bills below £2 it would involve a great deal of administrative work which would be hardly worth while. But he was quite willing to consider the matter again to see if any further concession could be made.

QUESTION TIME

Ex-Service Men and Neurosis

Captain J. A. L. DUNCAN asked the Prime Minister what steps were taken by the Service departments when they discharged men on grounds of neurosis or mental instability to inform the civil authorities of the facts of each case; and what steps the civil authorities took to protect such men from the consequences of actions for which they might not be responsible on account of the state of their minds.—Mr. WINSTON CHURCHILL replied: A scheme is at present being developed by which any man or woman discharged from any of the three Services on grounds of neurosis or temporary instability who appears likely to need social service care can receive it. This may imply medical treatment, the finding of suitable work or other help. The discharged man will at his own request be put in touch with a suitable civilian social agency. Work of this type has already been done informally, but it is hoped in future to make it much more widely available. The Ministry of Pensions is fully informed of the facts relating to all discharges and arranges continuance of hospital treatment where necessary. It is neither desirable nor legally correct to notify medical facts about individuals who are discharged to civil authorities in any automatic way.

Captain DUNCAN: Is the Prime Minister aware that the numbers of men involved already run into thousands and that the problem is daily growing more urgent? In view of these facts will he press on this new scheme at the earliest possible moment? Further, can he tell me under whose auspices it will be run—the Ministry of Health, the Ministry of Pensions or the Ministry of Labour?—Mr. CHURCHILL: I have already dealt with the greater part of the supplementary question in my answer. I regret to say that I am not apprised of the answer to the last part, but I will ascertain that.

Mr. RHYS DAVIES: May I ask the Prime Minister, in anything he does in connexion with these tragic cases, to bear in mind that the vast majority of cases of men discharged from the Forces owing to neurosis, where there is no pension, are known to the separate health insurance societies? Further, is he aware that there already exist mental welfare associations connected with local authorities?—Mr. CHURCHILL: I think my answer shows that we are treating this in a sympathetic manner and that active developments will be pursued.

1. See *Lancet*, 1942, ii, 650.

Infectious Disease in England and Wales

WEEK ENDED APRIL 24

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1770; whooping-cough, 1827; diphtheria, 710; paratyphoid, 5; typhoid, 3; measles (excluding rubella), 13,490; pneumonia (primary or influenzal), 866; puerperal pyrexia, 156; cerebrospinal fever, 83; poliomyelitis, 7; polio-encephalitis, 0; encephalitis lethargica, 0; dysentery, 69; ophthalmia neonatorum, 101. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on April 21 was 2314, including scarlet fever, 591; diphtheria, 209; measles, 721; whooping-cough, 319; enteritis, 104; chickenpox, 51; erysipelas, 3; mumps, 10; poliomyelitis, 1; dysentery, 27; cerebrospinal fever, 14; puerperal sepsis, 21; enteric fevers, 6; german measles, 26.

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 11 (1) from measles, 9 (1) from whooping-cough, 15 (0) from diphtheria, 47 (15) from diarrhœa and enteritis under two years, and 30 (1) from influenza. The figures in parentheses are those for London itself.

Liverpool reported 3 deaths from whooping-cough.

The number of stillbirths notified during the week was 228 (corresponding to a rate of 35 per thousand total births), including 22 in London.

Appointments

ANDERSON, V. F., MD LOND., DPH, DT: senior MO British Honduras.
PEPPER, B. O., MRCS: MO, Gold Coast.
The Chief Inspector of Factories has appointed the following examining surgeons:
SANDERSON, IAIN, MB EDIN., DTM & H, for Cleland, Lanark;
SCHOFIELD, H. R. D., MRCS, for Morecambe, Lancs; and
TEGGART, BRYCE, MB GLASG., for Milngavie, Dunbarton.

Births, Marriages and Deaths

BIRTHS

BOASE.—On April 24, at Kampala, Uganda, the wife of Dr. A. J. Boase—a son.
BURNHAM-SLIPPER.—On April 30, at Old Colwyn, the wife of Captain C. N. Burnham-Slipper, RAMC—a daughter.
CURTIS.—On April 27, in London, the wife of Surgeon Lieut.-Commander F. J. Curtis, RNVR—a son.
GINSBORG.—On April 25, at Ealing, the wife of Dr. S. Ginsborg—a son.
GROVE.—On April 27, at St. Ives, Hunts, the wife of Dr. W. S. Grove—a son.
HENDERSON.—On April 21, at Oxford, the wife of Captain P. W. Henderson, RAMC—a son.
MACLAY.—On April 30, in London, the wife of the Hon. Walter Maclay, MRCP—a son.
MCKENZIE.—On April 23, at Gerrards Cross, the wife of Squadron-Leader William S. McKenzie, FRCS—a son.
PATERSON.—On April 28, in Edinburgh, the wife of Major I. D. Paterson, RAMC—a son.
POOLE-WILSON.—On April 26, in London, the wife of Lieut.-Colonel D. S. Poole-Wilson, RAMC—a son.

MARRIAGES

ABBEY-SMITH—ROBERTSON.—On April 27, at Newbury, Roger Abbey-Smith, FRCS, to Muriel Mary Robertson.
BYRNE—ORCHARD.—On April 28, at Devizes, Joseph Connel Byrne, MB, of Pewsey, to Rosalind Girsha Orchard.
LANGLEY—PORTER.—On April 29, at Buxworth, George Johnson Langley, FRCP, of Altrincham, to Elsie Porter, MD, of Chinley.
MOSELEY—BARLOW-POOLE.—On April 29, in London, John Moseley, major, RAMC, to Celestine Barlow-Poole.
NIXON—PATERSON.—On April 26, at Reading, John Gerard Nixon, surgeon lieutenant RNVR, of Dublin, to Hilary Mary Paterson, WRNS.
REEVES—CAMPBELL.—On April 27, at Lewes, Tony Lothrop Reeves, MB, to Geraldine Margaret Campbell.
SMITH—WEST.—On April 24, at Quainton, Bucks, James Anstruther Smith, MB, to Elizabeth Ann Somerville West.

DEATHS

ALLEN.—On April 26, in Glasgow, William Allen, MB GLASG.
BATTYE.—On April 27, at Parkstone, Walter Rothney Battye, DSO, MS LOND., FRCS, lieut.-colonel IMS retd.
CRAIGHEAD.—During March, 1943, at sea, through enemy action, Alexander Clifton Craighead, MB ST. AND., DTM & H, lieut.-colonel IMS, aged 52, and his daughter, aged 12.
FIRTH.—On April 26, at Clifton, Bristol, John Lacy Firth, MD, MS LOND., FRCS.
GALLIE.—On May 1, at Winfrith, Dorchester, James Stuart Gallie, CB, CMG, DSO, LRCPE, major-general late RAMC, aged 73.
JOHNSTON.—On April 28, at Maidstone, Duncan Matheson Johnston, MD DURH., DPH.
RONALDSON.—On April 27, in Edinburgh, Thomas Rutherford Ronaldson, MB EDIN., FRCPE, aged 90.
SILLS.—On April 30, Clarence Ham Sills, MD TORONTO, MRCS.
SUMMERSKILL.—On May 2, William Summerskill, MRCS, of Blackheath, London, aged 76.

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Notes and News

THROUGH THE DOCTOR'S EYE

MEDICAL visitors to the Royal Academy this year will enjoy Mr. Francis Hodge's fine portrait of Sir Alfred Webb-Johnson. If it is intended for the walls of the Royal College of Surgeons it will bring fresh cheer into those austere galleries; for Sir Alfred in spite of the documents under his forefinger is clearly just getting ready to launch a shaft of his famous wit. Other medical portraits include one of Prof. A. E. Naish by John Wheatley, and a colour mezzotint of Dr. Nathaniel Spens after Sir Henry Raeburn, by H. Macbeth-Raeburn. Apart from these subjects of medical interest are rare, but some of the peripatetic naturalists at large in England now will enjoy the wild fowl of Charles F. Tunnicliffe and the Chinese geese of Lilian Andrews. A few of the nudes seemed far from well and could have done with a thorough overhaul. Visitors had the unusual and disconcerting pleasure of seeing how they looked to Feliks Topolski in his "Royal Academy War-time Private View."

ANOTHER FILM ON VD

THE Anglo-American Film Corporation's "Social Enemy No. 1" is not a documentary, but a story on Hollywood lines of a young man in a factory who goes to a doctor for premarital examination and is found to have contracted syphilis. The doctor, who is a quack, "treats" him and pronounces him cured; so the patient marries but infects his wife. This is discovered in the course of a campaign by the local medical officer of health to reduce the incidence of syphilis, whereupon the young man kills the quack doctor. After the trial all, of course, ends well.

From the medical angle the film is marred by disconcerting trifles such as the failure of the medical officer of health to remove the tourniquet after taking a sample of blood. More serious is the question whether enlightenment has not been sacrificed to entertainment. It belittles the intelligence of the public to imply that on a subject on which there is a very real desire for knowledge, the facts have to be dressed in the guise of a story. The documentary treatment illustrated by the Ministry of Information's "Subject for Discussion," reviewed in our columns on April 24, seems to us more suitable and effective.

GLENEAGLES FOR MINERS

The fitness centre for the rehabilitation of injured miners lately established at Gleneagles Hospital, Perthshire, was formally opened on May 7 by Mr. Thomas Johnson, MP, Secretary of State for Scotland. Gleneagles suffered its inspiriting change from a luxury hotel to an emergency hospital at the outbreak of war, when the Department of Health for Scotland took it over. Working with the Miners Welfare Commission and the Ministry of Fuel and Power, the department was able to complete plans for the new centre early this year, and the first miners were admitted in January.

A memorandum about the scheme has been sent by the MWC to all mine-owners' and mine-workers' associations. The aim is to reduce disability after injury and to fit miners for work again as quickly as possible. There is equipment for physiotherapy, occupational therapy, remedial exercises and physical instruction; and recreations and other social activities are provided, so that every man will have his day filled with absorbing occupations. Treatment is given free of charge, and the MWC meets travelling expenses, including free travel for patients who wish to go home for an occasional week-end.

The centre can take about 200 miners, and the average length of a course of treatment is about six weeks. Those admitted are to include not only those recovering from injuries but men with rheumatism and those who are convalescent after an illness or a surgical operation. The only conditions made are that every patient should have the prospect of an early return to work, and that he should be past the need for nursing care.

Patients are ultimately to be referred to the centre from hospitals or from miners' convalescent homes, or on the recommendations of their own doctors, of the mines medical service or the national health insurance medical service; but, to begin with, only hospital patients who have reached a suitable stage in their treatment, or those who have been recently discharged from hospital, will be referred to the centre.

Since becoming a hospital, Gleneagles has provided care for more than 10,000 patients. It is big enough to serve both as a hospital and as a fitness centre, though refitting will be its first concern in future unless an emergency arises. A consultative committee has been appointed to make the benefits offered widely known in the mining industry, to advise on non-medical matters relating to patients' welfare, and to help to settle them back in work when they leave the centre. This committee includes five members nominated by miners' organisations, five from the mine-owners' associations, and one each from the Ministries of Fuel and Power, and Labour and National Service.

University of Oxford

A special examination for the Radcliffe scholarship in pharmacology will be held in the department of pharmacology on Tuesday, July 6, at 10 AM. Candidates must have taken the pharmacology course in Oxford and have passed the examination in pharmacology and principles of therapeutics either in December, 1942, or June, 1943.

They should be prepared to answer questions on pharmacological methods and biological standardisation. Entries should reach the department not later than noon on July 5.

Royal College of Physicians of London

At a meeting of the college held on April 29, with Lord Moran, the president, in the chair, the following were elected to the fellowship:—

C. R. Burns, MD NZ. (New Zealand); Bruce Maclean, MD LOND. (Newcastle, Staffs); Janet K. Aitken, MD LOND. (London); Henry L. Wilson, MD CAMB. (London); Horace Joules, MD LOND. (London); Louis Minski, MD DURH. (Sutton, Surrey); A. G. Watkins, MD LOND. (Cardiff); Brigadier F. M. Lipscomb, MRCP; Major-General Sir Percy Tomlinson, MRCP; C. T. Andrews, MD BELF. (Truro); G. A. Elliott, MD CAPE TOWN (Cape Town); Reginald Ellis, MD MANC. (Manchester); Michael Kremer, MD LOND. (London); G. D. Kersley, MD CAMB. (Bath); D. U. Owen, MD LPOOL (Liverpool); R. Bodley Scott, DM OXFD (London); W. E. Snell, MD LOND. (London); F. S. Fowweather, MD LPOOL (Leeds); R. H. Parry, MD LOND. (Bristol); Kenneth Robson, MB CAMB. (London); J. L. Lovibond, MB CAMB. (London); Peter Kerley, MD NUI (London); Denis Williams, MD MANC. (London); W. Ritchie Russell, MD EDIN. (Edinburgh); J. W. Bigger, MD DUBL. (Dublin); Noah Morris, MD GLASG. (Glasgow); J. E. Gordon, MD RUSH Medical College (Harvard); James Mackintosh, MD GLASG. (Glasgow); Charles McNeil, MD EDIN., PRCPE (Edinburgh); L. C. Montgomery, MD MCGILL (Montreal).

The following, having satisfied the censors' board, were admitted to the membership:

J. L. Bates, MB LOND., J. L. D'Silva, MB LOND., T. S. Eddie, MB MELB., L. A. Hawkins, MB CAMB., J. C. Herapath, BM OXFD, MB WALES, A. W. J. Houghton, MB LOND., Major R. P. Howard, MD MCGILL, RCAMC, J. S. Lawrence, MD EDIN., Robert Marshall, MD BELF., FRCPI, Surgeon Lieut.-Commander G. J. Murray, MD DURH., RNVR, Sheila M. Newstead, MB LOND., Captain O. R. L. L. Plunkett, LRCP, RAMC, K. O. Rawlings, MB LOND., Frank Ridehalgh, MB CAMB., Sheila P. V. Sherlock, MB EDIN., J. V. Sparks, LRCP, J. R. Tasker, MB CAMB., W. G. Tillmann, MB LOND., and A. W. W. B. Woods, BM OXFD.

Licences to practise were conferred upon the following 238 candidates (208 men and 30 women) who have passed the final examination of the conjoint board:

D. G. Abrahams, Nachman Ambache, I. B. Amin, R. E. Arango, E. L. Arnold, D. C. Artingstall, Janet F. Atkins, D. R. F. Atkinson, John Attenborough, G. B. Badock, R. A. J. Baily, Ursula M. Baines, E. H. D'A. Banister, E. A. Barker, G. D. G. Barnes, Kathleen B. Bentley, D. H. B. Bevan-Jones, A. I. Black, Katherine M. Blacklock, W. R. Bodenham, G. L. W. Bonney, Margaret E. M. Boulton, B. T. Bowen, J. C. Brace, William Brand, A. R. Brandreth, Eric Brenman, Max Bresler, D. L. Bridgewater, J. G. Brown, M. M. Brown, P. F. E. Brown, E. A. Burkitt, J. D. Burton, R. J. Bush, R. J. Cairns, R. W. L. Calderwood, Janet Cameron, E. F. Carr, Satyamohan Chakravorti, G. I. Clarke, Peggy C. Cole, Eric Consterdine, Mark Conway, M. A. Cooke, J. C. Cooper, G. N. C. Crawford, D. G. Crawshaw, Alexandrina Currie, Vera J. Cutler, A. G. Davies, T. D. L. Davies, P. R. H. Davis, M. V. Doherty, G. H. P. Drake, P. D. A. Durham, W. H. Dyson, J. R. Elliott, J. W. Ellis, Norah C. Elphinstone, Arnold Elton, D. W. Evans, E. P. Evans, J. W. Evans, D. A. T. Farrar, Leopold Feldman, T. R. Fink, H. H. Firth, H. J. W. Fisher, C. J. Foord, Edith V. Foyle, R. S. Francis, H. J. Furstenheim, Sylvia B. Gadsden, M. B. Garnett, H. N. H. Genese, G. H. Gilford, T. H. B. Gladstone, S. R. S. Godkin, N. G. Graham, Raymond Greenwood, D. B. Griffiths, G. H. Gunson, William Haigh, W. J. Hanbury, B. H. Hand, J. E. Hargreaves, T. H. Hargreaves, R. D. Harland, Elizabeth M. Harper, Norman Harris, Harold Hassall, R. K. Hayden, Margaret I. Hendrie, Joyce M. Hierons, D. E. H. Hoffman, Michael Holborow, R. F. Hollick, J. P. Hopewell, B. E. C. Hopwood, N. H. Howes, Mary W. P. Huddart, W. G. H. Hunt, J. K. Irving, R. G. Isaac, M. O. Jenks, Elizabeth M. Jenman, A. I. Joffe, D. W. Johnson, M. W. Johnson, E. N. M. Johnston, Ambrose Jolleys, D. J. Jones, H. R. Jones, J. L. Jones, Mary P. L. Karney, G. E. Keen, David Kennedy, M. C. S. Kennedy, P. R. N. Kerr, C. H. R. Knowles, Macpherson Knowles, R. G. Law, Kathleen M. Lawrence, H. L. Leaming, Thomas Lee, Max Lewis, T. O. Lewis, Joseph Lister, Peter Lister, B. R. Little, Robert Loveless, R. S. McDonald, K. B. McKay, William Mackenzie, J. D. M.

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McLaren, P. G. Mann, M. G. Marks, Helen G. T. Maycock, Helen M. Mellor, Alexa Mitchell, Elizabeth R. Mitchell, J. N. Mitchinson, D. A. Mitchison, D. B. Moffat, H. E. A. Moody, L. J. Morgan, J. L. Morris, N. F. Morris, P. G. Mundy, Diana J. Myott, F. A. Nash, W. J. Naunton, Edith F. Newling, J. A. Nissim, J. K. Ogden, A. J. P. Oldham, J. K. O'Malley, F. T. Page, G. B. Parker, T. M. Parry, J. R. Partridge, B. D. Patel, J. C. R. Payne, P. R. Peters, M. G. Philpott, H. L. Pierce, D. R. L. M. Poirier, J. M. Potter, K. C. Precope, J. R. Preston, Maelgwyn Prosser, S. G. W. Rainsbury, D. H. Randall, R. L. Ray, T. L. Reeves, P. P. Reichenheim, J. H. Rey, J. K. Roberts, M. J. Robertson, G. H. A. Robinson, P. J. L. Roche, P. M. Roozé, W. D. Rowe, P. H. Schurr, S. J. Smith, T. B. Smith, W. K. Somerton, E. R. O. E. Spearing, Joan E. Spencer, A. Stafford Steen, F. M. G. Stammers, Siegfried Stecher, D. A. Stickland, D. F. Street, A. L. G. Stuart, W. F. Styles, I. H. Syed, Hedwig Symonds, Zahra Taki, R. G. Tasker, George Taylor, H. N. Taylor, N. B. Thadani, D. W. Thomas, J. B. Thomas, K. D. W. Thomas, P. J. B. Thomas, P. A. Thorpe, J. M. Titcombe, A. K. Toufeeq, J. D. Trethowan, Michael Trosser, Herbert Turner, W. J. Turney, S. M. Vine, H. N. Waller, David Waxman, B. J. Webb, J. D. Whitby, Donald Whitfield, W. N. Wild, J. R. F. Williams, Marion Williams, T. B. Willis, B. H. Wilshere, J. N. Wilson, J. R. Wilson, K. L. Wilson, R. E. Wilson, O. H. Wolff, C. R. Woodard, R. G. Woodsend, Barbara D. Wright, J. A. H. Wylie, Hynek Zaloudek, C. J. Zerny and Jacob Zimmermann.

Diplomas in medical radiology and in ophthalmic medicine and surgery were granted to the candidates named in the report of the meeting of the Royal College of Surgeons in our issue of March 20 (p. 385) and diplomas in child health to those named in our issue of April 17 (p. 512).

Royal Medical Benevolent Fund

The report presented at the annual meeting of the committee of management of the fund on April 27 showed a small increase (£176) under the heading of subscriptions and donations. The fund had also done well during the past year in the way of legacies, including the late Dr. T. C. Craig's generous bequest from which in future special grants can be made. Partly owing to transfers to the annuity list, the total amount distributed as grants (£21,893) was rather less than usual; the actual grants were not less generous, for war conditions have further straitened the means of many of the recipients. The election of more vice-presidents has been left in abeyance till after the war, but Miss H. Barlow, daughter of the president, has been elected a life member of the fund. The ladies guild also submitted an encouraging account of their work in 1942.

British Orthopædic Association

The spring meeting of the association will be held in Glasgow on Friday, May 14, at the Victoria Infirmary, and on Saturday, May 15, at the Royal Infirmary. On the Friday, at 9.15 AM, there will be a discussion on spinal cord injuries and in the afternoon there will be a meeting, largely clinical, followed by short papers, at Philipshill Orthopædic Hospital. On the Saturday there will be short papers followed by a clinical demonstration. In the afternoon there will be a joint meeting of the Association with the Scottish Orthopædic Council at Glasgow University.

Royal Society of Medicine

At 2.30 PM on Tuesday, May 11, at the section of psychiatry of this society there will be a discussion on amnesia in altered states of consciousness. The opening speakers will be Dr. Andrew Paterson and Mr. A. L. Zangwill. The section of pathology holds a laboratory meeting at the Bland Sutton Institute, Middlesex Hospital, London, W.1, at 4 PM on the same day. The annual general meeting of the clinical section will take place on May 14 at 5.30 PM.

Royal Sanitary Institute

A meeting of the institute will be held at the Royal Hall, Harrogate, on Saturday, May 15. At 10.30 AM Dr. S. A. Underwood, medical officer to Messrs Rowntree, will read a paper on rheumatism in relation to industry, and Dr. Wilfrid Edgecombe will describe treatment facilities for rheumatism at Harrogate. Dr. Robert Sutherland, medical adviser to the Central Council for Health Education, will speak on health education. Further information may be had from the hon. local secretary, Dr. D. D. Payne, Public Health Department, Municipal Offices, Harrogate.

Socialist Medical Association

The association is holding a health workers' convention at 5 PM on Sunday, May 16, at the Large Conway Hall, Red Lion Square, London, W.C.1. Dr. Horace Joules will speak on an immediate policy for the health services, and Dr. D. Stark Murray on the development of a socialised health service. Tickets may be obtained from the secretary of the association, 33, Murray Road, Northwood, Middlesex.

Royal College of Obstetricians and Gynæcologists

At a meeting of the council held on May 1, with Sir William Fletcher Shaw, the president, in the chair, the honorary fellowship was conferred on Sir Wilson Jameson, chief medical officer of the Ministry of Health, in recognition of his services to obstetrics and gynæcology. Gladys Hill and N. L. White were admitted to the fellowship and the following were admitted to the membership:

Janet E. Bottomley, Phillis Dingle, Marjorie O. Dunster, Louis Resnick, G. S. Sturtridge, and K. G. P. Worner.

At the annual general meeting of the college held afterwards the following were elected to council in place of those retiring:

Representatives of the fellows: Mr. A. J. McNair, London, Mr. A. A. Gemmell, Liverpool, Prof. J. Chassar Moir, Oxford, and Mr. R. H. J. M. Corbet, Dublin.

Representatives of the members: Mr. B. L. Jeaffreson, Leeds, and Dr. J. S. Quin, Dublin.

Harveian Society of London

On Monday, May 17, at 4.30 PM, Sir Thomas Dunhill will deliver the Harveian lecture to this society on short œsophagus with thoracic loculus of the stomach. The meeting will take place at 11, Chandos Street, W.1.

Medical Society of London

At 5 PM on Monday, May 10, at 11, Chandos Street, W.1, Dr. C. E. Lakin will deliver the annual oration to this society. The title of his lecture is Outside the Textbooks.

Nutrition Society

This society is holding a conference on nutrition in infancy on Saturday, May 22, at the London School of Hygiene, Keppel Street, W.C.1. Prof. L. G. Parsons will take the chair at 10.30 AM, and the following papers will be read: Dr. H. M. M. Mackay, nutritional needs in infancy; Wing-Commander R. W. B. Ellis, recognition of nutritional disorders in infancy; Dr. A. A. Moncrieff, treatment of nutritional disorders in infancy; Prof. J. C. Spence and Dr. J. V. C. Magee, public-health aspects; Prof. Noah Morris, Dr. S. G. Graham, Dr. J. V. C. Braithwaite and Mr. F. le Gros Clark will also speak. Further details may be had from the hon. secretary Mr. Leslie Harris, D.Sc., Nutritional Laboratory, Milton Road, Cambridge.

Posthumous Naval Honour

The Albert Medal has been awarded posthumously to Dr. William Chisholm.

The ship in which Dr. Chisholm was serving was torpedoed in darkness and immediately began to sink. A fire broke out, which enveloped the bridge in flames, and orders were given to abandon the vessel. She sank within eight minutes. One of the senior officers, who was on the bridge, was badly injured. He was taken to the surgery, where Chisholm immediately attended to him and afterwards, as he was helpless, helped him to the deck in order to get him away from the sinking ship. Chisholm's efforts were unsuccessful and neither he nor the officer was seen again. Although the ship was sinking rapidly, Chisholm remained and deliberately sacrificed his chance of safety in a gallant attempt to save the life of another.

Dr. Chisholm graduated from the University of Aberdeen in 1924 and served as medical officer on the West Coast of Africa before becoming a ship's surgeon with the Blue Funnel Line.

Medical Casualties

The following RAMC officers have been posted as wounded: Captain G. O. BROOKS, GM, MB Camb.; Lieutenant H. B. COWAN, MB Glasg.; and Major L. H. G. MOORE, MB Birm.

The following RAMC officers previously reported to be prisoners of war have now been posted as wounded and prisoners of war: WS/Captain W. E. G. Bradford, MB Lpool; Captain A. E. Brewer, MRCS; and WS/Captain J. K. Drucquer, MB Leeds.

German Hospital, London

Today, May 8, Dr. F. Parkes Weber celebrates a double anniversary; the half-centenary of his election to the honorary staff of the German Hospital, of which he is still the senior physician, and his 80th birthday.

Mr. CHARLES HANES, PhD, FRS, has been appointed director of food investigation in the Department of Scientific and Industrial Research. Dr. Hanes is at present serving with the Food Mission in North America.

Brigadier-General NORMAN T. KIRK has been appointed surgeon-general of the United States Army in succession to Major-General James C. Magee.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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PENICILLIN AND PROPAMIDINE IN BURNS

ELIMINATION OF HÆMOLYTIC STREPTOCOCCI AND STAPHYLOCOCCI

A. M. CLARK
M C, M A OXFD, CH M GLASG, F R F P S

LEONARD COLEBROOK
M B LOND

THOMAS GIBSON
M B GLASG, F R C S E

M. L. THOMSON
B SC, M B GLASG

A. FOSTER, M B GLASG

(*From The Burns Unit, Royal Infirmary, Glasgow*)

THE predominant part played by hæmolytic streptococcus and staphylococcus in interfering with the repair of burns makes it very desirable to perfect means for preventing and controlling infection by these organisms. Such control, and complete elimination of the infecting organisms whenever possible, is of importance not only for the avoidance of further damage to the injured tissues and for rapid healing—it may also have far-reaching epidemiological consequences which are not perhaps widely appreciated.

The work of recent years on streptococcus infections has established (Cruickshank 1935, White 1936, Willits and Hare 1941) that these organisms quickly find their way from the wounds of any patient infected with them on to his or her skin, bedding, clothes, and so to the dust of the surrounding air. Every patient so infected is therefore a potential menace to other patients in the ward whose wounds are not infected—and that menace increases directly in proportion to the number of streptococcus-infected wounds. Apart from the dissemination of streptococci from such patients by dust, social contacts, clothes, bedpans, thermometers, toys, &c., the manifold opportunities for transfer during the process of dressing the wounds are too well known to need emphasis. It follows that, in any surgical ward where burns are being treated along with clean cases, and still more perhaps in wards where a number of burned patients are being treated together, the prompt elimination of hæmolytic streptococci should take a predominant place in the routine anti-infective policy.

Until 1941 no method was known whereby these streptococci could be eliminated at will, and promptly, from a superficial wound. In that year Colebrook and Francis reported that a daily powdering with sulphanilamide usually led to the disappearance of hæmolytic streptococci within 3 or 4 days and that rapid healing was often associated with that disappearance.

Further experience has shown, however, that sulphanilamide is not quite the ideal agent for this purpose. In the first place it is ineffective against certain sulphonamide-resistant strains of streptococcus, which are not infrequently met with (Francis 1942, Clark et al. 1943). Secondly, the daily reapplication of the powder is undesirable, especially in extensive burns, since it involves painful dressings and disturbance of the regenerating surface. (The substitution of a sulphonamide cream which, by providing a depot of the drug, allows of less frequent changes of dressing, has not proved so effective as daily powdering in eliminating streptococci.) Finally, the use of sulphanilamide powder, reapplied daily, or even of sulphanilamide creams if they contain more than 5% of the drug, on extensive burns, is not without risk of excessive absorption (Hooker and Lam 1941, Gordon and Bowers 1942). These considerations have led us to study penicillin, and later propamidine, as alternative agents for eliminating streptococci and staphylococci from burns. The clinical use of penicillin has lately been described by Florey and Florey (1943), and the treatment of wounds with propamidine by Thrower and Valentine (1943) and McIndoe and Tilley (1943). Brief reports on propamidine in burns have been made by Morley and Bentley (1943) and by Kohn, Hall and Cross (1943).

The penicillin used in the investigation was prepared in the Sir William Dunn School of Pathology, Oxford, from material grown there and from metabolism liquor provided by Kemball, Bishop & Co. Ltd. Some material was also provided by ICI (Dyestuffs) Ltd. We are indebted to Messrs. May and Baker for supplies of propamidine.

Penicillin

In a few cases the powdered sodium salt was lightly dusted on the burn, but this proved too painful to continue with. A solution of this salt emulsified with 'Unemul' (aluminium hydroxide) was next tried, but proved a much less satisfactory form of application than a cream made up with lanette wax SX and castor oil (at first cod-liver oil), which has now been adopted as the routine preparation. This base, for which we are indebted to Prof. J. P. Todd, of the Royal Technical College, Glasgow, is identical with that employed in the sulphanilamide cream with which some 1000 burns have been treated during the past year. (A report upon these cases is in preparation.) The method of preparation is as follows:

The Base.—Heat lanette wax SX (50 g.) and castor oil (120 c.cm.) together at 60–70° C. till the wax is melted, and then add, with gentle stirring to avoid aeration, 275 c.cm. of sterile water at 60° C. The resulting cream is stable and of approximately neutral reaction.

Penicillin.—Dissolve penicillin powder (either sodium or calcium salt) according to its unitage in sterile distilled water to make a solution of about 800 Oxford units per c.cm. Of this solution, add 5 c.cm. as required to 30 g. of the base; mix thoroughly. The final strength is about 120 units per gramme of cream.

This gives a very satisfactory bright yellow cream, soft enough to spread easily on the wound without pain. It has no tendency for the penicillin to separate. It retains its activity with but little impairment for 15 days at room temperature and for four weeks at least in the refrigerator at + 2°C.*

The above cream has been applied only to burns known to be infected with hæmolytic streptococci—or, in one or two cases, with staphylococci. It is spread fairly thickly over the wound and for an inch or so around and then covered with gauze and wool. (At first tulle-gras was applied over the cream to avoid sticking of the gauze, but this appears to be unnecessary. It is not yet clear whether any advantage would be gained by confining the cream under an impervious covering such as butter muslin impregnated with soft paraffin. This is being investigated.) The application is repeated four times at intervals of 48 hours. Samples of the cream taken from the dressings after that period have been found to be devoid of activity, but samples at 24 hours have usually shown some effect. A swab is taken from the wound for bacteriological examination before each reapplication and on several occasions after the course of penicillin is finished. To make sure that enough penicillin was not being carried over on the swab to inhibit growth, an area on the plates has often been planted with a suspension of staphylococcus and streptococcus. These control plantings have always given normal growth.†

For the last few months the calcium salt (30 to 50 units per mg.) has been chiefly used and has given as good results as the sodium salt. It is easier to handle as it is not so excessively hygroscopic.

We have seen no toxic effects, either local or general, from such applications—nor have they caused any pain. In most cases the separation of sloughs has taken place at about the usual time (15–25 days), but occasionally has been slower. Healing has been rapid whenever it was not delayed by the presence of sloughs or complete destruction of the skin over a wide area.

* As a rough test for activity, it suffices to flood a blood-agar plate with a sensitive streptococcus or staphylococcus fluid culture, diluted about 2000 times. Dry off for half an hour in the incubator and then place in the centre a small quantity of the cream. Transfer the plate to the refrigerator till next morning (to allow of diffusion of the inhibitory principle) and then incubate. A satisfactory cream will give a zone of inhibition covering 3–5 cm. in diameter.

† As a further control the following experiment was carried out. A culture of staphylococcus and streptococcus diluted twofold in serum was spread on an area of normal skin (10 sq. cm.) and allowed to dry (5 min.). Penicillin cream was then spread thinly over the area and two minutes later two moist swabs were rubbed over it, carrying away a slight but perceptible amount of cream. One of these was used for planting direct on a blood-agar plate; the other was planted after a preliminary soaking in sterile water to dilute the penicillin. Both plates grew staphylococcus and streptococcus freely; there was no difference between them.

A similar test was carried out with propamidine, with the same result.

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TABLE I—TREATMENT WITH PENICILLIN

Case No.	Age (years)	Site of burns, approx. size (sq. cm.) and condition	No of days since burning and previous treatment	No. of positive swabs (hæm. strep.) before penicillin treatment	Hæm. strep. in swabs after beginning penicillin treatment	Strength of penicillin applied (units per g. of cream)	Clinical progress and notes
1	24	Upper arm (25), clean, granulating	48. Sulph. cream	8 in 6 weeks	Negative 5th day (swab sterile)	215	Healed rapidly. Staphylococcus disappeared
2	2½	Chest (64), clean, granulating	44. Sulph. cream	8 in 6 weeks	Neg. 3rd day	250	Healed well. Staph. disappeared 3rd day
3	1½	Arm (90), clean, granulating	28. Sulph. cream	3 in 13 days	Neg. 4th day (sterile swabs 4th, 6th and 9th days)	250	Healed rapidly. Staph. disappeared 4th day
4	2	Arm (120), clean, granulating	31. Sulph. cream	4 in 18 days	Neg. 3rd day	215	Successfully grafted over penicillin powder 4th day
5	2½	Hand (8), resolving septic lesions	19. Sulph. cream	3 in 10 days	Neg. 5th day	215	Only 2 applications. Healed 7th day. Staph. disappeared 5th day
6	2	(i) Abdomen (180); (ii) thigh; (iii) arm. Deep sloughs, nearly separated; wounds dirty	19. Sulph. cream	4 in 9 days	Neg. 4th and 7th days. Reinfected (? from arm) 9th day. All areas neg. after	215	Good progress despite sepsis and sloughs Successfully grafted 9th day
7	48	Foot (50), septic	16. Sulph. cream and oral sulph.	3 in 9 days	Neg. 3rd day	140	Healed 7th day. Staph. disappeared 3rd day
8	32	Forearm (30), resolving septic lesion	37. Eusol and sulph. cream	3 in 18 days	Neg. 3rd day	Powder	Healing after 2 applications. Staph. persisted
9	3½	Back (150)	17. Sulph. cream	2 in 5 days	Neg. 8th day (but 3rd application was omitted by mistake)	140	Good healing
10	57	Axilla (35), septic with sloughs	15. Sulph. cream	2 in 4 days	Neg. 3rd day	140	Good resolution. Staph. disappeared 3rd day
11	34	Chest (100), slowly resolving septic lesion	24. Sulph. cream (2 days)	2 in 3 days	Neg. 3rd day	Powder once, then cream	Healing very slow (partial destruction lower layers). Staph. disappeared 3rd day
11a	34	Chest (100), slowly regenerating lesion	35. Sulph. cream, penicillin and trypsin	2 in 2 days	Neg. 4th day	..	Healing still slow. Staph. disappeared 4th day
12	18	(i) and (ii) Both feet (100), septic	23. Sulph. cream 10% and eusol	3 in 18 days	Neg. 7th day (no swabs 3rd and 5th)	..	Almost healed in 7 days. Staph. disappeared
13	13	(i) and (ii) Both feet (100), much pus	21. Sulph. cream	1	Neg. 5th day (no swab 3rd)	..	Good healing. Staph. disappeared
14	37	Axilla (250)	38. Sulph. cream	3 in 3 days	Neg. 3rd day and after	55	Only 2 applications; *pyocyanea* persisted
15	28	Multiple (100), small granulating areas	46. Grafting	2 in 3 days	Neg. 3rd, 5th, 7th days. Reappeared 2 days after 4th application	Powder and cream	Good healing. Scabs probably hindered contact
16	34	Neck (70), recent burn, acute infection	9. Sulph. cream 10%	2 in 2 days	Neg. 7th day (no swabs 3rd and 5th)	125	Almost healed 7th day. Staph. disappeared
17	34	Arm (150), recent burn with deep sloughs. Not inflamed	17. Sulph. cream	2 in 3 days	Neg. 3rd day	125	Sloughs separated slowly—otherwise very satisfactory
18	24	Ankle (75), frankly septic	16. Sulph. cream	1	Neg. 3rd day	125	Sepsis disappeared promptly—very good healing
19	25	R. hand (150 ±), recent burn, acutely inflamed	5. Sulph. cream	4 in 4 days	Neg. 3rd day	125	Good resolution. Acquired *Ps. pyocyanea* during treatment
20	32	Shoulder (255), acute sepsis following grafting	76 days	2 in 5 days	Neg. 9th day	62	Inflammation subsided rapidly. Good healing
21	1½	Chest (30), septic	10. Sulph. cream 10%	2 in 2 days	Neg. 3rd day	62	Healed rapidly. Staph. disappeared
22	3	Face (50), septic	7. Sulph. cream 10%	3 in 9 days	Persisted for 7 days	110	Child interfered with dressings
23	51	R. leg (30), septic, suppurating	12. Sulph. cream (one day)	2 in 2 days	Neg. 5th day (swab sterile)	110	Healed very well. Staph. disappeared. In comparable lesion on L. leg (treated with sulph. cream). Hæm. strep. persisted 10 days
24	2	Scalp (30), septic granulations	42. Eusol (one day)	2 in 3 days	Neg. 3rd and 5th days. Reappeared 7th, then absent	125	Difficult to keep dressing in place
25	1½	Chest (20), granulating wound	23. Sulph. cream (8)	3 in 9 days	Neg. 3rd, 5th, 7th days. Reinfected 5 days after last penicillin	125	Difficult to keep dressing in place. Hæm. strep. quickly disappeared during second course of penicillin. Staph. disappeared
26	5	Chest (250), granulating wound	55. Sulph. cream	2 in 5 days	Neg. 7th day (swab sterile)	125	Good healing

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TABLE I—TREATMENT WITH PENICILLIN—*continued*

Case No.	Age (years)	Site of burns, approx. size (sq. cm.) and condition	No. of days since burning and previous treatment	No. of positive swabs (hæm. strep.)* before penicillin treatment	Hæm. strep.* in swabs after beginning penicillin treatment	Strength of penicillin applied (units per g. of cream)	Clinical progress and notes
27	23	Shoulder (200), granulating wound with some grafts	16. Sulph. cream	2 in 5 days	Neg. 5th day (swab sterile)	125	Good healing. Staph. disappeared
28	4	Leg (100), clean granulating wound	34	2 in 4 days	Neg. 5th day	125	Good healing. Staph. disappeared
29	1½	Scalp (150), septic granulations	13. Sulph. cream	2 in 9 days	Neg. 5th day (swab sterile). Reinfected 9 days after last penicillin	125	Difficult to keep dressings in place. Healing slow
30	11	Leg (100), septic	5	One	Neg. 5th day	125	Good healing (15 days). Acquired *Ps. pyocyanea*
31	31	(i and ii) Abdomen, (iii) (700) both breasts, (iv) L. forearm, (v) R. arm, (vi) granulating wounds with some sloughs,	21. Sulph. cream 10%	2 in 4 days	All neg. 3rd day	125	Remarkably rapid healing. Staph. disappeared
		(vii) Thigh (L.) (100)	29. Sulph. cream 10%	3 in 8 days	Neg. 3rd day	125	Penicillin withheld at first to see if hæm. strep. remained while other burns were being treated. It healed rapidly with penicillin
32	56	R. knee (200), inflamed granulations	27. Tannic jelly, eusol, propamidine (10 days)	10 in 23 days	Neg. 3rd day	220	Hæm. strep. not quite eliminated by propamidine—healed rapidly under penicillin. Staph. much reduced
33	1½	(i–iii) Neck and chest (40), 3 granulating wounds	26. Sulph. cream 10%	2 in 4 days	Neg. 3rd day (swab sterile on 5th)	220	Good healing. Staph. (6 + swabs before treatment) disappeared 5th day
34	9	Chest (50), clean, granulating	14. Propamidine (10 days)	7 in 14 days	Neg. 3rd day	220	Hæm. strep. had persisted under propamidine. Staph. disappeared under penicillin
35	32	Chest (150), clean, granulating	21. Propamidine (10 days)	8 in 14 days	Neg. 3rd day	210	Hæm. strep. had persisted despite considerable healing. Healing faster under penicillin. Staph. (9 + swabs before) disappeared 5th day
36	31	(i) Thighs and (ii) buttocks (1200), large infected sloughs and some 2nd degree	6. Sulph. cream 2%	2 in 4 days	Persisted but reduced in number	ca. 125	Remarkably good. Finally lost hæm. strep. after 16 days
37	19	(i) Back and (ii) arm (600), clean, regenerating 2nd degree	20. Sulph. cream 10%	3 in 10 days	Neg. 3rd day	ca. 210	Rapid healing. Infection by hæm. strep. not heavy
38	1	Abdomen and thigh (40), clean, granulating	14. Sulph. cream 10%	2 in 5 days	Neg. 3rd day	ca. 210	Healed rapidly. Staph. disappeared 5th day
39	2½	Chest (80), clean	12. Sulph. cream 10%	2 in 2 days	Neg. 3rd day	ca. 210	Healed rapidly
		CASES IN WHICH PENICILLIN WAS APPLIED TO GET RID OF STAPHYLOCOCCUS					
40	10	Leg (15), clean, granulating wound	47. Sulph. cream 10%	5 in 32 days	Staph. disappeared 5th day	125	Healed in 11 days
41	60	Sole of foot (9), indolent lesion, pus	73. Sulph. cream 10%, &c.	..	Staph. persisted	..	Healed in 11 days
42	1½	Hand (40), granulating	19. Sulph. cream 10%	3 in 18 days	Staph. much diminished 3rd and 5th days, then absent	140	Healed well

* In cases 40, 41 and 42 for "hæm. strep." read staphylococcus.

As table I (column 6) shows, hæmolytic streptococci disappeared from 41 of the 54 wounds (76%) within 3–5 days from the first application of penicillin, and did not reappear after it was discontinued. It is extremely improbable, in the light of previous experience, that these streptococci would have disappeared spontaneously from so many wounds within a few days. In 5 cases with multiple burned areas, one area was left untreated by penicillin in order to see whether the streptococci would persist while they disappeared from the penicillin-treated areas. In every case that result was observed.

In the remaining 13 cases there was similar evidence of the effect of the penicillin upon the streptococci, although, owing to various circumstances, the records are somewhat less striking. Thus in 5 cases (4 small children with burns of face, neck, or chest, and one woman with extensive burns of both buttocks and thighs), it was difficult to prevent disturbance and fouling of the dressing; in 2 others the routine application at 48-hour intervals was not strictly adhered to, with the result that complete elimination of the streptococci was delayed for a few days; in another case a cream containing only 62 units per gramme was used, with similar delayed result; and in 2 others the wounds became reinfected some days after the penicillin had been discontinued—possibly from some outside source.

To sum up—of all the 54 wounds there was not one in which the application of penicillin appeared to be without any effect upon the streptococcal flora. In 7 instances the strains which promptly disappeared from the wounds were insensitive to sulphonamide.

Staphylococci also disappeared from many of the wounds (see column 8), and it is very probable that this would have happened with greater regularity if we had employed a somewhat stronger cream. In view of the supply difficulty our primary object at first was to deter-

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mine what was the smallest expenditure of penicillin which would achieve the rapid elimination of hæmolytic streptococci. That minimum would seem to be 4 applications of cream containing about 100–150 Oxford units per gramme. We are now employing creams of 200–210 units per gramme with a view to the better elimination of staphylococci.

The relative insensitivity of gram-negative bacilli to penicillin, which was demonstrated in vitro by Abraham et al. (1941), was confirmed by our experience with burns, and by the few plate tests we carried out. Coliform bacilli, *B. proteus* and *Ps. pyocyanea*, when present, usually persisted in the wounds.

Propamidine

Up till now we have employed only a 0·1% cream in Mumford base (lanette wax, hard paraffin and technical white oil), as supplied to us by Messrs. May and Baker.

TABLE II—TREATMENT WITH PROPAMIDINE

Case No.	Age	Site of burns, approx. size (sq. cm.) and condition	No. of days since burning and previous treatment	No. of positive swabs (hæm. strep.) before propamidine treatment	Hæm. strep. in swabs after beginning of propamidine treatment	Clinical progress and notes
1	2	(i) R. foot (5), septic	9. CO/S 10	1 (9th day)	Neg. 3rd day	Healed in 7 days. Staph. persisted
		(ii) L. foot (8), septic	23 CO/S 10	6 in 23 days	Persisted till healed	Healed in 11 days
2	13	Hand (15), septic	4. Eusol (1)	2 in 2 days	Neg. 5 days	Healed in 7 days. Inflammation disappeared 2nd day
3	15½	Hand (20), septic (lymphangitis and œdema)	15	1 (15th day)	Neg. 3rd day	Healed in 4 days. (Lymphangitis and œdema gone in 2 days.) Staph. disappeared.
4	35	R. arm (20), inflamed	7. Eusol (1)	2 in 2 days	Neg. 3rd day	Healed in 4 days
5	55	Groin (10), septic	6. Eusol (1)	2 in 2 days	Neg. 3 times after 5th day	Did not return after 11th day. Presumed healed
6	1½	Hand (5), septic	9. Eusol (1)	2 in 2 days	Neg. 3rd day	Healed in 4 days. Staph. persisted
7	62	Hand (10), septic	5. Eusol (1)	2 in 2 days	Neg. 3rd day	Healed in 6 days. Staph. persisted
8	1½	Neck (10), clean	8. CO/S 10	3 in 6 days	Neg. 3 times after 5th day	Healed in 25 days, delayed by continuous movement. Staph. persisted
9	32	Hand (50), clean, granulating	15. CO/S 10	1 (12th day)	Neg. 3rd day. Reappeared 6th day	Healed in approx. 40 days. Grafted on 19th day
10	31	Leg (50), inflamed (inguinal adenitis)	35. CO/S 10 (33 days)	1 (35th day)	Neg. 5 times after 3rd day	Interfered with dressing (17th day) and became reinfected. Staph. persisted
11	1	Forehead (10), septic	18. CO/S 10 (11 days)	2 in 11 days	Neg. 6th day. Reappeared on 8th day	Child interfered with dressings. Staph. persisted
12	15	Leg (100), inflamed	3	2 in 4 days	Persisted	Healed in 12 days
13	26	Leg (75), inflamed	9. CO/S 10 (7 days)	2 in 7 days	Neg. twice after 7th day	5 days between 2nd and 3rd applications. Healed in 17 days. Staph. persisted
14	14	Leg (200), inflamed and œdematous	1	2 in 2 days	Persisted	Inflammation and œdema disappeared rapidly. Healed in 8 days
15	2	Forehead (60), inflamed	28. CO/S 10 Penicillin	1	Neg. 5 times after 3rd day	Healed in 23 days
16	2	Face (3), inflamed	2	2	Neg. after 4 days	Healed in 4 days. Staph. persisted
17	14	Leg (50), septic	4	1	Neg. after 5 days	Healed in 5 days. Staph. persisted
18	75	Hand (60), inflamed	19. Picric acid	1	Neg. after 6 days	Healed in 6 days
19	36	Leg (10), septic	5	3 in 3 days	Neg. after 5 days	Slow healing (35th day) owing to slough. Staph. persisted
		Heel (5), inflamed	5	1	Neg. 3rd day	Healed in 11 days. Staph. persisted
20	5	Arm (10), inflamed	6	2 in 2 days	Neg. 3rd day	Healed in 2 days
21	3½	Arm (50), clean, granulating	17. CO/S 10	3 in 17 days	Neg. 3 times after 3 days	Slow healing owing to deep patches (3rd degree)
22	20	Arm (50), inflamed (axillary adenitis)	12	1	Persisted	Healed in 10 days. Staph. persisted
23	1½	Arm (40), inflamed	1	1	Neg. 9th day. Hæm. strep. reappeared on 16th	Propamidine probably failed to get rid of hæm. strep.
24	12	Leg (150), clean, granulating	78. CO/S 10 Albucid 5%	3 in 12 days	Neg. after 4 days	Healed in 30 days
25	55	Leg (10), inflamed	24. CO/S 10	2 in 22 days	Neg. 4 times after 5th day	Still under treatment. Staph. persisted
26	56	R. leg (200), septic	5	2 in 3 days	Persisted	Quickly lost hæm. strep. and healed rapidly under penicillin
		L. leg (100), septic	5	2 in 3 days	Persisted. Only one negative swab (9th day)	Rapid healing (19 days)
27	32	Chest (250), inflamed	5. Eusol	3 in 5 days	Persisted	Quickly lost hæm. strep. and healed rapidly under penicillin
28	9	Abdomen (50), septic	17. CO/S 10 Eusol	2 in 3 days	Persisted	No reason for failure. Quickly lost hæm. strep. and healed rapidly under penicillin
29	6½	Leg (10), inflamed	16. CO/S 10	2 in 3 days	Neg. 4th day	Healed in 10 days
30	17	Leg (5), septic, œdematous	6	2 in 3 days	Neg. 3 times after 5th day	Healed in 9 days. Œdema gone in 4 days
31	1½	Foot (50), septic	9. CO/S 10	2 in 8 days	Neg. after 5th day	Staph. disappeared on 5th day also

CO/S 10 = Castor-oil sulphanilamide cream, 10%.

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This is a slightly stiffer preparation than the cream we have used as a base for penicillin and it has been found advisable to spread it on linen or gauze rather than direct on the wounds, but either method will serve. Most cases have had 4 applications at intervals of 48 hours, but a 5th application was made to some recent cases who had not lost their streptococci after the 3rd or 4th.

No toxic effects have been observed, either local or general, nor have the applications caused any pain. The dressings did not tend to stick. Healing has been very satisfactory in most of the cases—including several of those in which the streptococcus was not eliminated (Cases 1, 12, 14).

The results obtained are shown in table II. It will be seen that the hæmolytic streptococci disappeared rapidly from 21 out of 34 wounds treated (62%). The failure to eliminate them from some of the remaining 13 wounds was probably attributable to interference with dressings, &c.; in other cases (e.g., 1 (ii), 25, 26, 27) there is no satisfactory explanation, but it is possible that a rather stronger cream would have been successful. A 0·2% cream is now being tried. All the strains which failed to disappear from the wounds under propamidine treatment were tested by the ditch-plate method of Fleming (1940–41), with concentrations of 1–5000, 1–10,000, and 1–20,000 propamidine, but there was no difference between the zones of inhibition obtained with these strains and those which disappeared rapidly from the wounds.

We have not yet applied propamidine to wounds infected with sulphonamide-resistant streptococci, but in-vitro tests with four such strains indicated that they were just as sensitive to this drug as sulphonamide-sensitive strains.

In the concentration used propamidine appeared to have less influence on the staphylococci than penicillin, although in some cases these disappeared promptly.

Discussion

There can be little doubt that penicillin, as applied in the cases here reported, offers a much more effective means for the rapid removal of hæmolytic streptococci and staphylococci from a superficial wound than sulphanilamide. It appears to be also more effective than propamidine (0·1%), but a decision on this point must await further trials with the latter drug applied in somewhat higher concentration.

If an abundant supply was assured, the dressing of burns with penicillin cream from the beginning would seem to offer the best chance of avoiding infection by hæmolytic streptococci and staphylococci, but such dressings would probably need to be renewed every second day owing to the instability of the active principle. It is unlikely that toxic effects would be encountered even with extensive burns in view of the fact that none were met with when very large amounts of penicillin were administered intramuscularly (Florey and Florey 1943). In the case of propamidine, we do not yet know what are the chances of toxic effects, either local, if it is used in greater concentration than 0·1%, or from absorption into the circulation. Experiments on mice have shown that relatively small doses (8 mg. per kg. injected intravenously) may be fatal, but we have no means of determining how much can be absorbed from human wounds, and little is known as to the sensitiveness of man. It behoves us, therefore, to proceed cautiously in applying this drug to extensive burns.

Pending its production on a much larger scale than at present, the available supplies of penicillin could probably best be employed by limiting its application to burns known to be infected by hæmolytic streptococci; preferably in centres where burns are collected, in order to avoid wasteful distribution and deterioration on keeping. A very small amount is sufficient for the treatment of many burns when it is employed in this way. In the burn wards of the Glasgow Royal Infirmary, with an average of 18–20 beds occupied, 100,000 units per month have proved more than sufficient.

Looking to the future, the acquisition of this new power to control and eliminate infections by streptococci and staphylococci seems to be a big step towards the aseptic repair of burns, which must be regarded as the aim, just as it is for other accidental and operative injuries.

To reach that aim two other big advances will be necessary, viz.:

(1) The working out of a complete defensive system against cross-infection in wards, analogous to that of the operating theatre, but designed to meet the very different conditions of ward work.

(2) The discovery of chemotherapeutic agents capable of controlling and preventing infection by the organisms insusceptible to sulphonamides, penicillin and propamidine—such as coliform bacilli, *B. proteus*, and *Ps. pyocyanea*—which commonly invade burns during the stage of separation of the sloughs.

Summary

Penicillin in the form of a cream was applied to 54 burns and scalds in various stages of healing, with a view to the elimination of hæmolytic streptococci. In 41 of the wounds (76%) these organisms disappeared within five days and did not reappear. In 7 instances the strains which promptly disappeared were insensitive to sulphonamide. There were no cases in which the application of penicillin appeared to have no effect. Staphylococci also disappeared quickly from many of the wounds. Healing was usually rapid and no toxic effects were observed.

Propamidine was also applied in the form of a cream (0·1%) to 34 similar burns. Hæmolytic streptococci disappeared within five days from 21 of the wounds (62%). In 8 cases, however, they persisted during treatment with propamidine. (Of these, 3 lost their streptococci promptly when they were later treated with penicillin. In-vitro tests gave no indication that the strains concerned were resistant to propamidine, and no explanation is forthcoming for the failure.) Healing was very good in many of these cases also; in others not quite so rapid as with penicillin. No toxic effects were observed.

Coliform bacilli, *B. proteus* and *Ps. pyocyanea*, when present in the wounds, were apparently not affected by either of these agents.

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TREATMENT OF BURNS AT TOBRUK

NORMAN J. LOGIE, M B ABERD, F R C S
LIEUT.-COLONEL RAMC

THIS paper is founded on experience gained in the treatment of approximately 300 burns of all degrees of severity while serving as a surgical specialist in a general hospital, working as a casualty-clearing station, in Tobruk before its fall in 1942. Detailed data were amassed, but the work entailed was largely wasted for three reasons: (1) Tobruk fell, so the documentary evidence was lost; (2) all my colleagues except two are prisoners of war; and (3) it is well-nigh impossible in an active theatre of war to follow up cases. In addition a hospital ship on its way to the base was lost by enemy action and over 40 of our burn patients perished. This tragedy further cut into our hopes of definite proof by examination of final results. Hence I am able only to give my own experiences and impressions.

I will say almost nothing about the general treatment of burns, for that is a relatively non-controversial subject. The only point I would like to hammer home is that heat in the treatment of shock, whether caused by burns or other trauma, must not be abused—warm the patient but do not cook him to the extent of sweating. The rest of my remarks will be confined to the local treatment.

REQUIREMENTS

To my mind there is no real problem in the treatment of burns of the 1st and 2nd degree provided that

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surgical principles are adhered to. They do well with many different forms of treatment. The real difficulties arise with the 3rd-degree burn, and it was the potential and actual 3rd-degree burn that worried us. The great majority of the burns dealt with were due chiefly to the abuse, and misuse, of petrol—e.g., sand fires, debugging dugouts, lighting matches while clothes, or dressings on hands, were petrol-soaked. The areas burnt varied from the surface of both upper extremities, with or without face, to that of all four limbs and of body, back and front: it was seldom that only one limb was involved.

The efficient treatment of the burnt area entirely depends on whether anæsthesia is available and can be given. If no anæsthesia is available, no efficient cleansing is possible and therefore no tanning compound should be used, for it only shuts in potential sepsis and makes the subsequent cleansing more difficult. In such circumstances only first aid is possible, and all that is necessary is to cover the burnt area and protect the blisters from injury and rupture with an ample sterile dressing. My own opinion, at the moment, is that a sterile soft-paraffin dressing over sulphathiazole powder is best. It protects, is soothing, is not sticky and is easily removed. It does not interfere with subsequent cleansing, for the paraffin peels off with the superficial layers of the skin as they are removed. The paraffin-sulphathiazole layer should be covered with gauze and then cotton-wool, the whole covered with a bandage. Dry dressings stick, are not so soothing, and do not protect nearly so well. So much for the first-aid treatment of the burnt area.

If anæsthesia is available, proper cleansing is possible; and this applied to Tobruk. But we had to contend with the following difficulties. The hospital was in an old Italian barracks which had suffered much; ends were out of wards, windows and doors were non-existent and the roof was not all it might have been. Our orderlies (we had nurses for a very short time when things had quietened down) worked hard and well, but they were not nurses and they were few in number. Our land line of communication was 400–500 miles by an indifferent road, followed by a railway journey; so ill patients could only go by sea, in a hospital ship which only came when there were enough patients to fill her. Recurrent dust-storms raised a fine dust which penetrated everywhere and everything; flies abounded; and of course water was scarce. Therefore we had to evolve a dressing for burns which would—

(1) Be easy and quick to apply and yet efficient. (The time-factor was important for on one occasion we dealt with 30 burns in two days apart from other casualties.)

(2) Relieve pain and shock.

(3) Protect the burn against infection, dust, dirt and trauma both while in hospital and in transit.

(4) Reduce nursing to a minimum, and make it easy and simple.

(5) Ensure that when the patient and his burn reached the base (possibly days later) both were in such a state that further treatment—e.g., skin-grafting—was not delayed unduly—a most important point.

With these ends in view, we tried out various methods.

DYE METHODS

We soon gave up the use of dyes, because drying was slow, repeated applications were necessary, protection was poor, infection occurred easily, and they required more attention than we could give them.

TANNING METHODS

We early decided that silver-nitrate tan (10% silver nitrate and 10% tannic acid) was the best of these. It was simple and rapid to apply. A good tan was quickly produced by one application, for it dries easily. The tan was firm and had good protective and trauma-resisting properties. Once it was applied no further attention or dressings were necessary. (All we did insist on was that an orderly went round once a day with a pot of triple dye and painted the edges of the tan. This we found helped to prevent infection creeping in at the edges.) Finally, it effectively sealed off the burn and prevented external fluid-loss; though, with the availability of plasma, we were never really worried by this bogy.

Method of application.—The burn was exposed and, if the water-supply permitted, the area was washed down with soap and water; then the skin was peeled off with dry swabs, paying particular attention to the edges. (This was more effective and quicker than picking about with forceps and scissors—except for hands, fingers and feet, but here I think that simple emptying of the blisters under rigid aseptic technique followed by a surface dressing may be better than removal of the skin and exposure of a fresh raw area.) The silver nitrate was painted on with swabs, and the tannic acid was then applied in a like manner. By applying the silver nitrate first we felt that the risk of tannic-acid absorption might be obviated.

LIMITATIONS OF SILVER-NITRATE TAN

The above method had certain limitations.

(1) It could not be applied to the face; the tan was too rigid and peri-orbital and peri-oral deformities were feared. Instead we used a variety of methods—including aniline dyes, sulphonamide-paraffin masks, and simple sprinkling with sulphonamide powder. Whatever we used, the face became superficially septic and crusted, but with no ill effects.

(2) We ultimately avoided silver-nitrate tan in complete circular lesions of the hands and fingers, but had no hesitation in applying it to partial lesions of the hands and fingers. For complete lesions we used sulphonamide and soft-paraffin dressings, and encouraged early movement.

(3) In the region of joints the tan tended to crack and infection followed. This was partially avoided by moving the joints while applying the tan, and completely avoided by splintage. To splint them we first contrived wire cages for each limb out of Cramer wire and plaster-of-paris with the object of—

(*a*) leaving the tan exposed to the air, for the tanning methods do best when left exposed;

(*b*) preventing the limbs lying on, or being pressed by, bedclothes (at this time consisting of army blankets only);

(*c*) preventing cracking at the joints.

This elaborate method was given up; for each case was a problem in splintage, and the contriving of a cage for each limb, and for every variety of burn, took too long. We ultimately contented ourselves with either having no splintage, or, where joints were involved, having a light removable plaster-slab splint.

(4) Complete body burns presented a problem to which we found no answer except rapid evacuation by air, which was not available; and these cases travel badly in the later stages. The tan does well on the body provided it is not exposed to constant pressure. This could not be obviated in burns involving both the front and back, and in consequence the part exposed to pressure generally broke down and became a sodden mess within 4–5 days.

(5) Once the tan was applied, it was irremovable until it separated by the normal process of healing in 2nd-degree burns, or by the exudate thrown out by the 3rd-degree burns. This spontaneous separation of the tan in 3rd-degree burns takes time, for the tan often adheres closely to the underlying necrotic tissue and may have to be actually excised. All this prevented early access to the burn for more suitable treatment at the base—e.g., hydrotherapy and skin-grafting—thus retarding recovery and causing bad wastage.

(6) 10% silver-nitrate tan is a caustic, and if applied to an advanced 2nd-degree burn it is, I think, quite likely to precipitate a 3rd-degree burn which would not otherwise occur. I personally cannot tell with any degree of accuracy which 2nd-degree burn is trembling on the brink of being 3rd-degree, and therefore I could not avoid the above danger.

The caustic effect of silver nitrate is indicated by the depths of anæsthesia required during its application. It was a common experience to clean a burn under anæsthesia, which was apparently deep enough, but when the silver nitrate was applied the patient would begin to struggle. For this method, therefore, deep anæsthesia is necessary.

(7) In complete circular lesions of the limbs there is a danger of a "tourniquet effect" from the rigid tan and associated swelling of the limb.

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SULPHANILAMIDE-PARAFFIN AND PLASTER

Despite the above objections and difficulties, the silver-nitrate method suited us. But we were not at all certain that it was the best, taking the long view, so we started to try sulphanilamide powder, covered with soft-paraffin gauze and protected in plaster. Sulphathiazole would have been used if supplies had permitted.

The comparison of results did not reach completion, for the enemy rudely interfered. It was carried out by treating one limb, or the opposite upper and lower limbs, with silver-nitrate tan, and the other limbs with sulphanilamide-paraffin and plaster-of-paris. We cleaned the burns as for silver-nitrate tan, then sulphanilamide powder was sprinkled on by means of a rubber-bulb blower, or simply by shaking it out of a pot with a gauze cover. By increasing or decreasing the number of layers of gauze we got a fine, or coarse, layer of powder as required. Soft-paraffin gauze, covered by another layer of dry gauze, was applied and the whole covered with plaster-of-paris.

Advantages.—This method proved very satisfactory for limb burns both from our point of view and from that of the base medical officers, for it fulfilled all our provisos.

(1) It was easy and relatively quick to apply.

(2) Protection was good against dirt, dust, infection and trauma.

(3) Nursing was reduced to a minimum, for even the daily paint with triple dye was not required.

(4) The patient and his burn got to the base in such a condition that subsequent treatment was not hindered. The burn was easily accessible; there was no sticky tan to remove; the caustic effect of silver nitrate did not exist; and the joints were not so stiff. We expected that the sulphonamide would help to keep the burn free of the hæmolytic streptococci, but apparently it did not. The three burns I was able to culture at the end of a fortnight, when the plaster-of-paris was removed, grew hæmolytic streptococci; and this occurred despite the usual course of prophylactic sulphonamide by mouth. But neither the patient nor the burn seemed to mind.

(5) From verbal reports we heard that burns treated with sulphanilamide-paraffin and plaster-of-paris were approximately 14 days ahead of those treated with silver-nitrate tan, both in healing, and function, and were far more comfortable.

(6) The amount and depth of anæsthesia required for application of the dressing is less than for silver-nitrate tan.

Disadvantages.—Nevertheless there were certain disadvantages.

(1) It was difficult to retain the dressings on the body, for the time factor, the general condition of the patient and the lack of suitable appliances precluded the application of plaster jackets. Simple bandaging did not suffice; the dressings never stayed in position, and they soon became soiled. From our point of view silver-nitrate tan proved more suitable for body burns.

(2) The exudate from the burns soaked the dressings, and often the plaster, necessitating the changing of the plaster in 2–3 days; but this was no real hardship, and many did well for a fortnight before the plaster required changing.

(3) A real danger existed, in that the absorption of sulphanilamide from large raw areas is very rapid, and the concentration of the drug in the blood may reach a dangerous level. I have knowledge of one case where the blood concentration rose to 43 mg. per 100 c.cm. with subsequent death, and of other cases where toxic features have developed. It was suggested at one stage that sulphaguanidine should be used instead; because of its reputed slow absorption it might be less toxic and remain locally active for a longer period. This latter point is important; for if the local action of sulphonamides is short-lived and they cannot be reapplied—e.g., under plaster—is it worth while liberally sprinkling them over an extensive burn, which, once cleaned, may do just as well with ordinary sterile soft paraffin? In a study which circumstances interrupted I found reason to suspect that the low blood concentration of sulphaguanidine is due not to slow absorption but to very rapid excretion in the urine. For this and other reasons its use was not further considered.

SUGGESTIONS

From these incomplete experiences I make the following tentative suggestions:—

(1) In the present state of our knowledge, the best first-aid treatment of burns is to dust them with sulphathiazole powder—which has a wider range of bacteriostatic activity than sulphanilamide—and cover them with a sterile greasy dressing. Tanning compounds should not be used in first aid.

(2) Where anæsthesia is possible the burn should be cleaned. Limb and face burns may suitably be treated by applying sulphathiazole powder (sparingly if the burn is large) and covering with soft-paraffin gauze and plaster-of-paris to the limb. Chemotherapy should not be started till at least 12 hours later, and fluids should be given freely. Body burns should be treated with silver-nitrate tan, unless evacuation is rapid, when they may be treated as for the limbs. Liquid paraffin should be instilled into eyes.

No claim is made that these methods of treatment are suitable for other conditions or theatres of war.

In conclusion I should like to say that I was but one of a surgical team who all took part in working out the treatment of these burn cases. Although the views expressed here may not coincide in every respect with those of my less fortunate colleagues, with whom I have been unable to collaborate in writing this paper, I feel that their names should be associated with it. They were Lieut.-Colonel A. Simpson-Smith, Major Collins, Major Hunter, Major N. C. Rogers, Major Blackburn (anæsthetist), Captain Johnstone and Captain H. J. McPherson.

I would like to thank Colonel M. Williamson MC, AMS, for his interest in the preparation of the paper.

THROMBOSIS

TREATMENT AND PREVENTION WITH METHYLENE-BIS-(HYDROXYCOUMARIN)*

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IN previous papers[1] I reported the successful use of methylene-bis-(hydroxycoumarin)—hereafter called "AP" (antiprothrombin)—in the treatment of 17 cases of thrombosis. Other investigators,[2] working independently, seem to have seen the possibility of a beneficial effect of AP in thrombo-embolic diseases.

TREATMENT OF THROMBOSIS

My 100 cases included 56 of antecrural (leg) thrombosis, 10 of crural (thigh) thrombosis, 10 of combined crural and antecrural thrombosis and 24 of phlegmasia alba dolens. At the first sign of thrombosis 0·5 g. of AP was given by mouth in tablets containing 0·25 g. The prothrombin index was followed daily and kept within the limits 20–60 by giving a further 0·25 g. of AP if it rose to 50–60 or 0·125 g. if it rose to 40–50. A too rapid return of the prothrombin index to normal should be avoided because of the risks of a recurrence of the thrombosis. Medical treatment was combined with active movements of the leg in half the cases. Movements of the ankle were allowed from the first day, and after a few days the patients were also allowed to move the knee provided there was no pain or other contra-indication. In cases of thrombosis of the femoral or pelvic veins movements of the knee were begun after 6–8 days or when the local pain had almost gone. Fig. 1 shows the temperature and prothrombin index in a typical case of postpartum thrombosis treated with AP.

The effect of AP was estimated by noting the period between the beginning of treatment and the time when the leg was flaccid and painless and most of the swelling had disappeared ("recovery"). At this stage most of the patients could be allowed out of bed when not

* Paper read at the annual meeting of the Swedish Association of Surgery, Dec. 4, 1942.

1. *Svenska Läkartidn.* 1942, **39**, 1 (with English summary); *Ibid* p. 1041 (with English summary); *Lancet*, 1942, **1**, 318.
2. Butt, H. R., Allen, E. V. and Bollman, J. L. *Proc. Mayo Clin.* 1941, **16**, 388. Bingham, J. B., Meyer, O. O. and Pohle, F. J. *Amer. J. med. Sci.* 1941, **202**, 563. Shapiro, S., Sherwin, B. and Gordimer, H. *Ann. Surg.* 1942, **116**, 176. Jansen, K. F. *Ugeskr. Laeg.* 1941, **103**, 1586.

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prohibited by other conditions. The results are set out in the table. It will be seen that the time for recovery ranged from 1 to 3 weeks. The mean duration of treatment of thrombosis in Sweden before anticoagulants

RECOVERY TIME IN 100 CASES OF THROMBOSIS TREATED WITH ANTIPROTHROMBIN

	Days for recovery		
	All cases	With movements	Without movements
Phlegmasia	16·7 ±6·8 (24)	14 (8)	18 (16)
Crural and antecrural thrombosis	11·1 ±3·9 (10)	9 (4)	12·5 (6)
Crural thrombosis ..	10·7 ±2·4 (10)	9 (5)	12·5 (5)
Antecrural thrombosis	8·0 ±3·7 (56)	6·5 (32)	10·3 (24)

Numbers of cases are in parentheses

were used was 5–8 weeks. Active movements shorten the time for recovery significantly. In 2 cases embolism occurred during treatment. All patients survived.

There is a well-marked individual variation in response to AP, so that the dosage must be adjusted by observations of the prothrombin index in each patient. A sudden fall in temperature is sometimes seen on the day after a dose of AP without much decrease in prothrombin index or in coagulation time.. This seems to indicate that AP acts not so much by delaying coagulation as by interfering with the mechanism of thrombosis. The sedimentation-rate of the red cells should be followed and the treatment continued until the rate is below 60 mm. in 1 hour, provided it is not raised as a result of other diseases. AP treatment can be continued for 4–6 weeks without any complications, if the prothrombin index has not been kept too low.

TREATMENT OF THROMBOPHLEBITIS

The dosage of AP adopted in my 32 cases of thrombophlebitis was the same as for thrombosis. In half the cases active movements were allowed. A striking improvement was seen in many cases. The mean time for recovery was 6·5 days. No difference was found between the groups treated with and without movements. The mean stay in hospital was 10 days. In

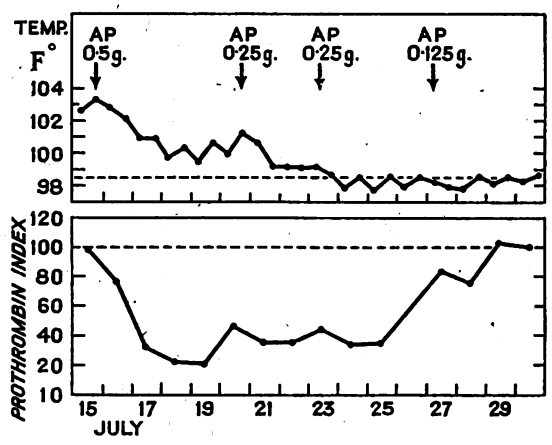

Fig. 1—Postpartum crural thrombosis. Note the fall in temperature after every dose of AP and the relation between the temperature and prothrombin curves.

4 cases a spreading of the process was seen during treatment. AP combined with sulphathiazole had no better effect than AP alone. A recurrence was seen in 1 case within 14 days.

POSTOPERATIVE PROPHYLAXIS

Only operation cases known to be disposed to thrombosis were selected for treatment. In a series of 278 operations 170 cases received AP postoperatively. The patients treated were all from the women's clinic at the Sahlgrenska Hospital in Gothenburg. The treatment was introduced in February, 1942. The operations were: supravaginal hysterectomy (with or without appendicectomy), 37 cases; the same operation combined with salpingectomy or oöphorectomy, 15 cases; salpingectomy, oöphorectomy or extirpation of ovarian cyst (or these operations combined), 93 cases; laparotomy or other minor operations, 18 cases; operations for uterine or vaginal prolapse, 7 cases. The following operation cases were not treated: (1) young women with salpingitis or ovarian cyst; (2) cases of cæsarean section; (3) cases in which the area of operation was large and hæmostasis difficult.

On the day after operation 0·5 g. of AP was given, and the prothrombin index was then kept between 30 and 60 with subsequent doses of 0·25 g. as in the curative treatment. In most cases the second dose was given 6 days after operation. Usually only three doses were required, making a total of 1 g. In general the patients got up on the 12th day and were discharged from hospital on the 14th day.

Only 1 case developed antecrural thrombosis and in this patient vaginal bleeding prohibited effective treatment. In another case mild signs of embolism were seen a week after the AP treatment had ended. No patient died during 1942 of thrombo-embolic disease. The striking effect of AP treatment is seen in fig. 2, which shows the frequency of thrombosis, embolism and death from embolism during 1940, 1941 and 1942.

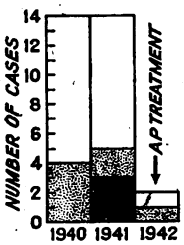

Fig. 2—Incidence of postoperative thrombosis (white), embolism (shaded) and deaths (black) at the women's clinic, Sahlgrenska Hospital, Gothenburg. Prophylactic treatment with AP was introduced in 1942. The number of cases operated on ranged from 250 to 325 annually.

In 10 cases the postoperative temperature kept about 2° F. above normal for 4–6 days and then suddenly dropped to normal the day after a dose of AP had been given (see fig. 3). Since such an effect of AP is only seen in thrombotic diseases it is assumed that in these cases AP has prevented the development of an incipient thrombosis. In cases of postoperative fever of uncertain origin a dose of 0·25–0·5 g. of AP can therefore be of differential diagnostic value. Even a temporary drop involving only the morning temperature on the day after AP was given is suggestive of thrombosis as the cause of the fever.

COMPLICATIONS AND CONTRA-INDICATIONS

Apart from a few cases with nausea, vomiting and diarrhœa, hæmorrhages were the only complications observed; these included bleeding under the skin and in the operation area, hæmaturia, epistaxis and vaginal and rectal hæmorrhage. Hæmorrhage was seen in 9% of the therapeutic series and in 8·8% of the prophylactic. In nearly all cases it amounted to no more than oozing and could be stopped by giving 100–300 mg. of vitamin K (methyl naphthoquinone dihydrosulphate) by mouth. In 3 cases hæmorrhage was more profuse and was treated with vitamin K and blood-transfusions (300–400 c.cm.) with immediate effect. Skin bruising larger than the palm of a hand should be treated with blood-transfusion because it may lead to necrosis of the skin.

The following conditions were considered contra-indications to AP treatment:

(1) Diseases associated with hæmorrhage. The menstrual flow was however not increased provided the prothrombin index remained above 30.

(2) Heart diseases with symptoms of decompensation, severe myocardial degeneration or a blood-pressure above 200 mm. Hg.

(3) Pregnancy and the first 3–5 days of the puerperium.

(4) Severe albuminuria.

(5) Nephritis, enterocolitis and hepatitis.

SUMMARY

Methylene-bis-(hydroxycoumarin), the anticoagulant first obtained from spoiled sweet-clover hay, was given by mouth to 100 cases of established venous thrombosis in the lower limb and 32 cases of thrombophlebitis. In thrombosis the mean recovery-time was reduced to 1–3 weeks, a third of what it was before anticoagulants were used, and in thrombophlebitis to 6½ days.

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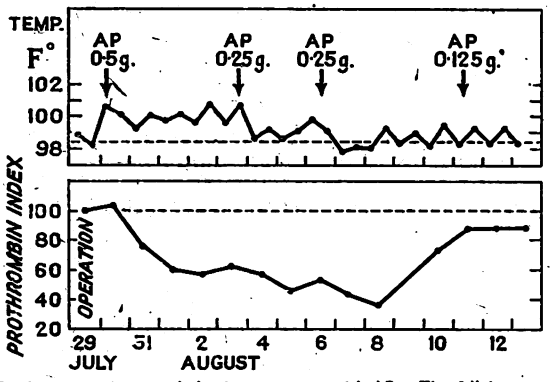

Fig. 3—Postoperative prophylactic treatment with AP. The fall in temperature after every dose of AP suggests that the cause of the fever was a thrombotic process which would probably have developed into a manifest thrombosis without AP treatment.

The anticoagulant was also given prophylactically to 170 patients after various gynæcological operations during 1942; only 1 case of venous thrombosis and 1 mild case of embolism were seen, and there were no deaths from these causes. In 1941 there had been 9 cases of thrombosis and 5 of embolism, with 3 deaths, in a comparable series.

In about 1 case in 10 hæmorrhage occurred as a complication, but in only 1 in 100 was it at all profuse and in these it was readily controlled with vitamin K and blood-transfusions.

SOME OBSERVATIONS ON AUTOHÆMAGGLUTINATION

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WITH the increasing use of blood-transfusion and the great extension of blood donor panels under the Ministry of Health regional transfusion service scheme, more cases of autohæmagglutination are being noted. Autohæmagglutination has been defined by Boxwell and Bigger (1931) as "a clumping of erythrocytes into irregular masses, visible to the naked eye, occurring in the presence of the individual's own serum without bacterial action, at air temperature and reversible at body temperature," and a similar definition has been employed in this paper. The cases may be divided into two main types: (*a*) pathological; and (*b*) non-pathological. These cases associated with pathological conditions form the most important group and not uncommonly cause much difficulty if it is necessary to give them blood-transfusions. The non-pathological type occurs in normal persons and is usually found during the course of routine blood-grouping; autohæmagglutination may be very weak.

CASE-HISTORIES

The following 5 cases belong to the pathological type of autohæmagglutination.

CASE 1.—A girl, aged 14, admitted to hospital complaining of many years' history of gradually increasing lassitude and pallor, accompanied by cough and copious sputum. Bronchiectasis of left lower lobe. Left lower lobectomy successfully undertaken. Blood-count: red cells 4,000,000 per c.mm.; Hb. 56%; white cells 11,000 per c.mm. Sedimentation-rate 64 mm. in an hour (Westergren). Blood-group A, subgroup A_1. Cross-matching test showed that the patient's serum clumped her own and all group A blood at room temperature but not at 37° C. No transfusion given. The child's parents, both group A_1, showed no autohæmagglutination or other abnormal agglutinin.

CASE 2.—A girl, aged 18, admitted to hospital with pyrexia of unknown origin. Diagnosis: subacute bacterial endocarditis. Blood-culture persistently negative. Widal: *Bacterium paratyphosum B* (reduced titre), 1 in 50; all others negative. Had never had TAB. Blood-count: red cells 3,160,000 per c.mm.; Hb. 55%; white cells 12,000. Sedimentation-rate 60 mm. in an hour at 20° C. (Westergren). Blood-group A_1; serum of patient agglutinated at cross-matching test all group A blood, and her own cells at room temperature; no agglutination at 37° C. The patient was successfully transfused with 500 c.cm. of blood without any reaction. Autopsy confirmed the diagnosis.

CASE 3.—A man, aged 63, complained of pain in right chest, lassitude and loss of weight. Diagnosis: carcinoma, left lower lobe. Blood-count: red cells 4,420,000 per c.mm.; Hb. 84%; white cells 17,200 per c.mm. The patient died after first stage of complete pneumonectomy. Blood-group A, subgroup A_1. In the cross-matching test, serum definitely clumped group O bloods, but group A cells only weakly, at room temperature. No agglutination at 37° C. No transfusion given.

CASE 4.—A woman, aged 62, first complained of sudden sharp epigastric pains and jaundice. Patient was jaundiced and pale in 1938, and on examination spleen was much enlarged. Blood-count was impossible at room temperature, but early in 1939 it was possible at 20° C. Red cells 2,500,000; Hb. 52%; reticulocytes 29%. Van den Bergh: direct reaction, 12·5 units. Cell fragility was increased. Later the patient has developed Raynaud's syndrome affecting the fingers of both hands. Blood-group B at 37° C., but at room temperature appeared to be AB.

CASE 5.—A woman, aged 35, admitted urgently to hospital with severe lower abdominal pain and backache. Diagnosis (made later at operation): advanced ileal carcinoma. Occult-blood test negative. Blood-count: red cells 3,920,000; Hb. 58%. No reaction of any degree after transfusion of 600 c.cm. of group O blood (3 days old); blood-count two days later: red cells 4,060,000; Hb. 62%. Blood-group O. Cross-matching tests showed that the patient's serum clumped all group O cells (14 tested) but this clumping was not present at 37° C.

SEROLOGICAL INVESTIGATIONS

The sera from all 5 patients agglutinated homologous cells and also cells of other blood-groups in varying strengths.

1. The titres of the sera using many cells of groups A_1, A_2, B and O were determined by the method of Taylor and Ikni (1939). The results are given in table I.

TABLE I—TITRATIONS OF SERA AT ROOM TEMPERATURE

Serum	Blood-group	Cells				
		A_1	A_2	B	O	Own cells
Case 1	A_1	2	4	512	16	2
Case 2	A_1	4	8	256	32	4
Case 3	A_1	4	16	256	64	8
Case 4	B	128	128	128	256	64
Case 5	O	64	32	16	16	16
Anti-O ox serum 113	..	4	32	4	64	..

2. In each of the 5 patients the agglutinin responsible for the auto-agglutination was absorbed completely by group O cells at low temperature, although in the patients showing high titres with group O cells large volumes of packed cells were necessary. In case 4, the volume of packed cells was five times the volume of serum used. In each case the alpha- and beta-isoagglutinin remained in the serum and gave the same titres as before. Complete absorption with homologous cells was possible in all cases.

3. The clumped group O cells obtained (paragraph 2) were thoroughly washed with saline in the cold, and an agglutinin solution prepared by heating these washed clumped cells with a small quantity of saline at 37° C., centrifuging and removing the solution. The procedure was carried out in water-jacketed centrifuge tubes in order to maintain the desired temperature. By this means it was possible to obtain in saline solution the agglutinin responsible for the autohæmagglutination. This was examined and titrations carried out with cells A_1, A_2, B and O, several cells of each type being used. The results are shown in table II. In no case was agglutination present at 37° C., showing that results were not due to the presence of any residual anti-A or anti-B agglutinins.

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TABLE II—TITRATIONS OF AGGLUTININ SOLUTIONS AT 20° C

Agglutinin solution from	A_1	A_2	B	O
Case 1	0	2	0	4
Case 2	0	4	2	8
Case 3	4	64	8	128
Case 4	128	64	64	128
Case 5	8	4	8	16

4. Group specific substances A and B obtained by the use of pooled human saliva of "secretor" persons and—in the case of A—also by the use of a polysaccharide prepared from peptone, were added to the sera of cases 1–4 to remove the alpha or beta iso-agglutinin as the case might be (Goebel 1938, Wiener 1939). The serum therefore contained only the abnormal agglutinin. The comparative results of titration were similar to those shown for the iso-agglutinin solutions.

5. Characteristic changes at different temperatures were also observed; thus, there was an increase in all titres with a lowering of temperature and vice versa, the phenomenon being reversible. A "critical temperature" was found peculiar to each serum, at which agglutination just failed to develop. This estimation was made on a specially constructed warm stage.

Serum	1	2	3	4	5
Critical temperature in °C. ..	28	29	29	35	27

6. The auto-agglutinating property was not destroyed at 56° C. for 30 minutes.

7. Observations similar in part to those detailed above were carried out with an anti-O animal serum. This was obtained by absorbing a suitable ox-serum with A_1 B cells. An examination of 250 ox-sera as described by Dahr (1938) showed no. 113 to be the strongest (see table 1) although many others will make good anti-O sera.

8. The cells did not give any different results whether they were citrated, heparinised or obtained from the clot; moreover, the cells showed no other abnormality, except in case 3 in which the cells were shown to contain an excess of O substance.

DISCUSSION

Autohæmagglutination is usually first encountered when difficulties arise in carrying out certain hæmatological techniques such as blood-counts, blood-grouping, or cross-matching tests before transfusion, or determinations of sedimentation-rates which may be much increased. Case 4 was originally discovered because of the impossibility of doing a blood-count at room temperature. During the last five years in the clinical laboratory of the Manchester Royal Infirmary 60,000 blood-counts have been done, and this was the only such case encountered during that time. In blood-grouping in normal healthy persons, this phenomenon is rarely seen, but in pathological conditions it causes difficulty more often, and 2 such examples have been seen in 500 blood-groups on hospital cases. In cross-matching tests the condition is observed still more often since the auto-agglutinin causes difficulties at this stage, although the original blood-grouping was apparently satisfactory owing to the greater dilution of the agglutinin. Sedimentation-rate may be increased in case of high auto-agglutinin titre, and Jessen and Bing (1940) state that the cause can be demonstrated by repeating the test at 37° C. when the sedimentation-rate is less.

The cause of auto-agglutination is somewhat obscure but Dockery and Sachs (1941) recently suggested that an anti-O agglutinin present in certain sera may be responsible for the phenomenon. This appears to be so in cases 1, 2 and 3, but not in cases 4 and 5. Anti-O agglutinins occur rarely in human serum of groups A_1 and A_1 B, and act against O and A_2 cells, their reaction being stronger at lower temperatures; for this reason they have been called "cold" agglutinins. Anti-O agglutinin occurs in some animal sera, and absorbed ox-sera containing anti-O will react with cells of all groups but most strongly with O and A_2 cells. Dahr (1938 and 1939) has shown that O substance occurs in all cells in increasing quantity as follows:

$$A_1\,B \rightarrow A_1 \rightarrow B \rightarrow A_2 \rightarrow O.$$

Thus, if a strong anti-O agglutinin was present in human sera, especially if the cells contained excess O substance, autohæmagglutination would occur. Anti-O agglutinins present in normal human serum are usually too weak to cause auto-agglutination at room temperature.

In an examination of 952 blood samples collected from healthy blood-donors, the serum being separated at 37° C, 3 instances of autohæmagglutination were found, 2 instances belonging to group O, and one to group A_1.

The preparation of the agglutinin solutions also confirms the presence of an anti-O factor in the sera of cases 1, 2 and 3. Case 4, however, did not show this characteristic anti-O activity and the agglutinin solutions contained an agglutinin which reacted with all cells with almost equal intensity. Similarly in case 5 the auto-agglutinin attacked all cells, but those of group O cells more strongly, while cells of other groups showed a slightly lower titre. Kettel (1930) has also observed similar agglutinins. These two agglutinins are similar and have the same characteristics as those found in the 3 normal sera mentioned above.

Two of these cases (2 and 5) were successfully transfused without reaction. In case 5 the hæmoglobin was raised only slightly, but there was no reaction whatever, the stored blood (three days old) being given at room temperature. It is generally inadvisable to give blood at a temperature greater than that of the room, especially stored blood, since there is always a chance that overheating will cause hæmolysis; moreover, Degowin and his colleagues (1940) have shown that blood can be administered safely at room temperature. While it was not possible to estimate the life of transfused cells in case 5 owing to the group of the patient, the rise in hæmoglobin (4%) is lower than one would expect. This suggests that the auto-agglutinin present may cause a lytic effect on transfused cells, even though it is not active at 37°C.

SUMMARY

Five cases of autohæmagglutination are reported.

Two methods are described for isolating and examining the abnormal agglutinins present in these sera, depending: (*a*) on the preparation of agglutinin solutions; and (*b*) on the addition of specific polysaccharides present in saliva to remove isoagglutinins alpha and beta.

I wish to thank Dr. J. F. Wilkinson for permission to carry out the work in the Regional Transfusion Laboratory, Manchester, and also for much advice and help; and Dr. G. B. Manning for permission to publish case 2.

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UNIVERSITY OF LONDON.—Sir Ernest Graham-Little, MP, and Major-General P. H. Mitchiner will continue to represent the faculty of medicine in convocation and Prof. M. Greenwood, FRCP, FRS, will continue as a representative of the faculty of science.

WOMEN'S COUNSEL FOR NUFFIELD TRUST.—The trustees of the Nuffield Provincial Hospitals Trust have approved of the formation of a women's advisory council to help them "in the organisation and development of medical nursing, welfare and health services, especially in relation to the coördination of hospital services, of social medicine and of such other matters as will further the interests of women." Mrs. Montagu Norman has agreed to be chairman of the council, and Miss Frances Goodall, SRN, general secretary of the Royal College of Nursing, has been appointed honorary secretary. The members will include women chosen not as representing any particular organisation, but for their experience of hospital work and related services.

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SLIDE CULTURE METHOD FOR TUBERCLE BACILLI

K. S. ROSENBERG, M D PRAGUE

(*From the Department of Pathology, Clare Hall Sanatorium, and an EMS Hospital*)

THE method described by Pryce[1] for the cultivation of the tubercle bacillus on microscope slides appears to possess great possibilities. Briefly, this consists of spreading the tuberculous material on a slide, treating the slide with acid to destroy any contaminants, and, after washing the slide with sterile water to remove the acid, culturing the organism in a suitable fluid medium. The following investigations were made to test Pryce's method as a routine procedure.

TECHNIQUE

Choice of medium.—Pryce recommends laked or defibrinated whole blood. These were tried in parallel with Kirchner's serum-salt mixture, which consists of equal parts of normal human serum and a synthetic medium: disodium orthophosphate (Na_2HPO_4) 3 g.; monopotassium orthophosphate (KH_2PO_4) 4 g.; magnesium sulphate 0·6 g.; asparagin 2·5 g.; glycerol 20 c.cm.; distilled water to 1000 c.cm. The serum need not be fresh, but when more than 6 months old its growth-promoting properties seem to diminish. Kirchner's medium proved definitely superior to the other two.

Technique of culture.—Pryce advocates culturing the smears immersed in the medium in sterile Petri dishes. This method was tried along with others, with the object of finding a procedure which allowed of the culturing of the maximum inoculum with the minimum of medium and the least chance of contamination. The Petri dish method was abandoned owing to the large amount of medium per slide culture which it entailed and the high percentage of contaminated cultures which it gave. Culturing the slides in a sterile staining box, though reducing the ratio of medium to slide produced an even higher rate of contaminated cultures. Growing the preparation in a slide cell made by putting a glass ring over the treated smear, filling the cell with the salt-serum medium and sealing the cell with a sterile slide or cover-slip was very economical of medium, gave few contaminated cultures and had the advantage over the other methods that growth could be observed under the microscope without the necessity of taking down the culture; but it was too laborious for large-scale use. In the method finally adopted as most economical in time and medium, and producing fewest contaminated cultures, 1 oz. screw-capped bottles with perforated caps were used, the material for culture being spread on half microscope slides which had been divided lengthways.

The bottles are filled to capacity with water and autoclaved. Each specimen is spread on a cut slide and dried in the incubator. The specimens are then treated with 6% sulphuric acid solution for 45 min. in a previously sterilised staining rack covered with a glass lid. After this treatment with acid, two slides are placed facing outwards, with sterile precautions, in each bottle. They are allowed to remain in the water for 10 min., which is sufficient to wash off any acid remaining on the slides. The water is then sucked out by a water pump, a sterile needle being used to perforate the rubber washer in the cap of the bottle, and a trap being introduced between the needle and the pump to collect the water. In this way a vacuum is produced in the bottle and a sterile mixture of Kirchner's medium is run in. By this arrangement many of the manipulations which had given rise to contamination were avoided. The cultures are incubated for a week and then stained in the usual way with Ziehl-Neelsen. They are first examined under the low-power and red clumps of growing bacilli are easily detected. If no growth is visible, the specimen is examined with the oil-immersion lens.

RESULTS

Before finally adopting this method, an experiment was set up to estimate its reliability.

A suspension of a strain of tubercle bacillus was made in the way outlined by Corper,[2] so as to obtain approximately a billion bacteria per c.cm. From this suspension dilutions were made from 10^{-1} to 10^{-6}. One standard loopful of each suspension was spread on a slide and cultured. Parallel experiments with Loewenstein's medium were put up and the resultant growth compared. Allowing for the obvious superiority of Loewenstein's medium, owing to its greater nutritive value, the results seem to confirm the usefulness of slide culture. Whereas growth on Loewenstein was obtained with dilutions up to 10^{-4}, with slide culture positive results were not obtained beyond 10^{-2}.

Experiments indicate that 100,000 bacteria per c.cm. are necessary to produce a positive smear result. At least 10 bacteria per c.cm. seem to be necessary to produce growth on Loewenstein's medium. There is, therefore; a gap between 10 and 100,000 bacteria per c.cm. where in theory the result with the direct smear would be negative, and only a Loewenstein culture would produce a positive result. The above experiment seems therefore to indicate that specimens with between 1000 and 100,000 bacilli per c.cm. should give positive slide culture.

The method was then tried on specimens of sputum. It was found, first, that about 95% of specimens which on direct smear were positive showed good growth after 6 days, observable in 90% of cases with the low power. On these positive slides in addition to large clumps of growing bacilli, single bacilli were seen, which apparently had not yet started to multiply. On slides cultured for 2 weeks fewer single bacilli were observed. It seems likely therefore that not every bacillus started growth during the first few days. This might account for an occasional slide culture made with sputum positive on direct microscopic examination failing to show growth after a week's incubation. Specimens made from sputa which were negative on direct smear examination gave the following results with slide culture after a week's incubation.

Total sputa ..	105	Good growth ..	11
Purulent ..	58	Single bacilli ..	3
Non-purulent ..	30	Contaminated ..	3

Of 105 negative sputum specimens, 11 (10%) showed good growth after a week, but taking the figure of the purulent sputa only (and only among these were positive results obtained) the percentage amounts to 19. A few single bacilli were seen in 3 specimens on examination by oil immersion, but there was no obvious growth. It must be assumed, however, that the appearance of single bacilli in specimens negative to direct smear constitutes one of the initial stages of growth, and the percentage then amounts to 24. Only 3 specimens were contaminated (less than 3%). These figures compare favourably with our routine Loewenstein cultures, in which the figures over two periods of 6 months are shown in the table. The average ratio amounts in these to something like 1 sputum specimen in 5 with a positive result.

RESULTS IN ROUTINE LOEWENSTEIN CULTURES

Period	Total specimens	Negative	Positive	Contaminated
July 1941 to Jan. 1942	247	205	40 (17%)	2
Jan. 1942 to July 1942	244	191	51 (21%)	2
Total 1941–42 ..	491	396	91 (19%)	4

The specimens examined contained tubercle bacilli of the human type, so that it is impossible to say whether or not the method would be satisfactory for the detection of bovine strains. On one occasion, however, material in which a few bacilli could be found on direct examination and which proved subsequently to be of the bovine type showed a little growth after a week's cultivation in slide culture. Saprophytic acid-fast bacilli cannot be distinguished by this method from the tubercle bacillus and where there is any doubt culture on Loewenstein or guineapig inoculation will still be necessary.

SUMMARY

A new method of culturing the tubercle bacillus was put to test, and though the figures are not large enough to be conclusive they suggest that the method is valuable.

1. Pryce, D. M. *J. Path. Bact.* 1941, 53, 327.
2. Corper, H. J. and Cohn, M. L. *Amer. J. Hyg.* 1933, 18, 1.

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It is simple and inexpensive and has been given a limited trial in the routine examination of sputum. A positive result was obtained within a week in 14 out of 105 sputa negative on direct smear examination. It would take 3–6 weeks to get the same results by culture on Loewenstein medium. It seems that most tubercle bacilli begin to multiply in slide culture within a week, though with some the onset of growth is delayed beyond this time. By lengthening the period of cultivation up to 2–3 weeks the percentage of positive results could be increased; but the principal value of the method is that it anticipates the result of cultivation on Loewenstein's medium, and the slightly higher results obtained by delay would not outweigh the disadvantage of prolonging cultivation beyond a week.

I would like to thank Prof. S. P. Bedson for his suggestions and help in the writing of this paper, Dr. F. A. H. Simmonds for adopting the method at Clare Hall, and Mr. A. W. Griffin for his technical assistance.

FATAL AIR EMBOLISM AFTER INSUFFLATION OF THE VAGINA

R. LATHAM BROWN, M B SHEFF

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THE rarity of a death from intravaginal treatment prompts me to submit the details of the following case.

A primipara, aged 25, was due to be confined on July 10, 1942. Diagnosed as LOA, the head was reported engaged on June 6. She had complained of vaginal discharge in April, for which she received treatment by douching and painting. On May 8, treatment by vaginal insufflation of yellow 'Picragol' powder was started three times a week, and by May 22 she was reported so much improved that she was told she need not report again for treatment. Vaginal discharge recurred by July 1. The report on the vaginal smears stated that there were large amounts of monilia present, no gonococci being seen. Further vaginal insufflations were advised, and treatment was begun on July 3. Within a minute of the start of insufflation she complained of a feeling of being blown up, acute dyspnœa supervened, she had a fit, recovered slightly, then died.

At autopsy she appeared rather bloated and cyanosed. The orifices of the body were normal. There were no post-mortem gas changes in the body. The heart was enlarged, the right side dilated, the right atrium empty, and the right ventricle contained very little blood which was frothed into large bubbles. The blood was approaching arterial in colour but not so bright. The left side of the heart and the valves were normal. The muscle appeared somewhat fibrotic. The aorta and coronary vessels were normal, and the pulmonary arteries were empty. The right uterine plexus contained frothy blood similar in colour to that found in the right ventricle, but less bright. The right ovarian vein contained particles of yellow powder. The uterus was about full term, and contained a male fœtus with head in the brim of the pelvis. The cervix was drawn up and dilated to two fingers. The placenta was in the upper part of the uterus slightly over to the right. The edge of the placenta was stripped for a depth of about an inch to an inch and a half from the right side of the uterus. The membranes on that side were completely free. The membranes on the left side were normally fixed. There was slight hæmorrhage on the right side from the placental site, and blood had run down slightly towards the internal os. Blood sinuses on the right side of the uterus in the vicinity of the stripped part of the placenta and membranes contained frothy blood, brighter in colour than venous blood, but not so bright as arterial. These sinuses drained directly into the plexus of veins on the outer side of the uterus, which (as already noted) contained similar frothy blood.

DISCUSSION

Insufflation of the vagina with the cervix partly dilated had allowed the entrance of air into the blood sinuses of the uterus, after the ballooning effect of the insufflation had stripped the membranes and a portion of the placenta from their site. Death had been caused by air embolism.

Vaginal insufflation has been used successfully in many clinics on numerous occasions, and so far there had only been one recorded death from air embolism reported by S. J. S. Peirce.[1] It would be a pity if an efficient form of treatment were to fall into disrepute, when precautions might guarantee its harmlessness.

From the above findings it seems essential that there must be an efficient cervical barrier during this type of treatment. In normal primiparæ this is probably the case till late in pregnancy. (This woman was successfully treated within 8 weeks of term.) In multiparæ this is probably not the case, since the death from air embolism during similar treatment, recorded by Peirce, was in a 2-para who was then only four months pregnant.

Where an efficient cervical barrier cannot be demonstrated, some other form of treatment is indicated, and insufflation definitely contra-indicated.

I wish to thank the medical superintendent of the hospital concerned for giving me access to the clinical notes; and Major T. H. Bishop, HM coroner for Derby, for permitting me to publish my autopsy findings.

Medical Societies

SOCIETY OF MEDICAL OFFICERS OF HEALTH

AT a meeting of the fever hospital medical service group of this society on Feb. 26, with Dr. ANDREW TOPPING in the chair, a discussion on recent work on virus diseases was opened by Prof. S. P. BEDSON, FRS.

Influenza

Speaking first on the prophylaxis of influenza he said that though "A" virus, discovered by Smith, Andrewes and Laidlaw, is the most important ætiological agent, a "B" virus has since been identified by Francis, and "A" virus has itself been found to comprise a number of serological types. An efficient polyvalent vaccine of this virus is correspondingly difficult to prepare, but the observation of Horsfall and Lennette (1940) that cultivation of a strain of "A" virus with a particular strain of distemper virus gives it a broad antigenicity covering all the serological types, made it possible to prepare a vaccine for field trial. This bivalent vaccine has given only mediocre results; the morbidity in the vaccinated has been about half that in the unvaccinated. Active immunisation by spraying the nasopharynx with attenuated living virus, and passive immunisation by spraying with antiserum, await field trial.

In research on the *common cold* no advance has been made since the demonstration by Dochez and his colleagues that some forms of this condition are due to a virus. A limiting factor in investigation is the restricted host range of the causal agent: the chimpanzee and man alone appear to be susceptible.

Dr. C. H. ANDREWES, FRS, said that, using the best possible influenza A vaccine and injecting it shortly before an influenza A epidemic, one may hope for a 50% drop in incidence of influenza A (but not necessarily of all "clinical influenza"). In less favourable circumstances no obvious benefit will follow inoculation, which therefore cannot be said to be as yet a practical proposition for widespread use.

In England lately there has been some influenza every other year and a bigger peak every fourth year (as in 1929, 1933, 1937). Influenza A virus has been recoverable as a rule only in the odd years and especially in the peak years (1933, 1937). The expected epidemic in 1941 did not turn up, nor did influenza A appear in 1942 nor, as yet, in 1943. The widespread but mild influenza now current seems, on serological grounds, to be mainly influenza B. The virus is much more difficult to establish in animals from B than from A cases.

"Primary Atypical Pneumonia"

Professor BEDSON said that outbreaks of primary atypical pneumonia have been common, especially since the beginning of the war. The condition appears to be of virus ætiology but more than one virus is concerned.

Psittacosis.—One virus known to cause atypical pneumonia in man is psittacosis virus. Diagnosis of human infection rests on the isolation of the virus from the sputum by mouse inoculation, or the demonstration of specific antibody in the patient's serum by the com-

1. *Canad. med. Ass. J.* 1936, 35, 668.

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plement-fixation test. It is now recognised that birds of the parrot family are not the sole reservoir of infection. Infection has been demonstrated in the fulmar petrel; and human cases from this source have been described in the Faroe Islands (Haagen and Mauer, 1939); pigeons in this country have been found to be infected, and human cases derived from pigeons and the domestic fowl have been described. Strains of psittacosis virus from the different sources are antigenically similar but differ in their virulence for the mouse and pigeon. Consideration of psittacosis as a diagnosis should never be excluded because the patient has not been exposed to psittacine birds. Cats and kittens may be the source of human cases, since Baker reports that in America they suffer from naturally occurring infections with a psittacosis-like virus.

Relationship of psittacosis and other viruses.—A large group of viruses exists of which psittacosis is the type. They are alike in morphology and staining reactions and since they all stain by Castañeda's method, whereas other viruses do not, these viruses might be referred to as the Castañeda-positive group. Besides psittacosis virus, the group includes the viruses of lymphogranuloma venereum, meningo-pneumonitis (Francis and Magill 1938), a virus isolated by Eaton, Beck and Pearson (1941) from cases from atypical pneumonia (possibly pigeon psittacosis) and the viruses of trachoma and inclusion conjunctivitis. Rake and his colleagues (1942) have shown that all these viruses are closely related. It is suggested that they have a common ancestry and that what specific differences they possess have been acquired by long residence in a particular host species; psittacosis in a variety of birds; and the viruses of lymphogranuloma venereum, trachoma and inclusion conjunctivitis in man. It follows that the complement-fixation test has lost its specificity. A positive result merely means infection with one of this group of viruses. Similarly the Frei test loses much of its specificity.

Primary atypical pneumonia due to other viruses.—Viruses of the psittacosis group seem to be the cause of relatively few cases of atypical pneumonia. In this country serological sampling of outbreaks, both civilian and military, during the past two years has brought to light only three possible cases and these were in American soldiers. These three gave weakly positive psittacosis complement-fixation tests, the significance of which is doubtful. In America also the majority of cases appear to be due to some unidentified virus or viruses. Amongst the claimants to be causal agents of atypical pneumonia are the virus of Horsfall and Weir (1940), the virus of lymphocytic choriomeningitis known to infect by the respiratory route and produce a pneumonitis, and the virus recently isolated from cases of atypical pneumonia in America by inoculation of the cotton-rat.

In reply to Dr. R. CRUICKSHANK, who asked whether sulphonamides are of value in infections with psittacosis virus, Professor BEDSON said that some limited (unpublished) experiments he has made with sulphapyridine suggest that this drug is not altogether without effect on psittacosis in the mouse. Failure to respond to sulphonamide drugs is one of the criteria on which the diagnosis of atypical pneumonia is made. However, Hinshaw (1940) has reported one case of psittacosis which responded to sulphapyridine and two cases at the London Hospital have been treated with this drug with apparent success. An open mind on this question should, therefore, be kept until these drugs have been given a more extended trial.

Dr. H. S. BANKS asked whether primary atypical pneumonia is an interstitial pneumonia.

Professor BEDSON: "As far as is known: Yes. When it has been possible to examine histologically the lungs from cases of this condition, the primary changes appear to have started in the alveolar walls. The exudate which later appears in the alveoli consists of serum, mononuclear cells, desquamated epithelial cells, red blood-corpuscles and polymorphonuclear leucocytes, and the consolidation, when it occurs, is not as dense as in a lobar pneumonia. The view that the condition is primarily an interstitial pneumonia is supported by the X-ray findings which show, as a rule, either a reticular shadow or, if a whole lobe is involved, a lobar shadow of only moderate density.

Dr. CRUICKSHANK inquired how soon the complement-fixation test becomes positive in cases of atypical pneumonia due to viruses of the psittacosis group (ornithosis).—Professor BEDSON answered that it is usually positive in the second week. Two samples of serum should be examined, one in the early stage of the disease (2nd week) and a second in convalescence; a rising titre is of much greater significance than a single positive examination.

Immunity to Viruses

Among other questions answered were two from Dr. M. MITMAN.

Is the immunity to a virus fundamentally the same as the immunity to a bacterium?

Professor BEDSON: "The two types of immunity are similar in that they both depend essentially on specific antibodies. Those differences between the two that do exist are dependent on the different modes of life of bacteria and viruses. Parasitic and pathogenic bacteria live in the body fluids of their hosts; viruses are obligate intracellular parasites. Living cells are not permeable to antibodies. This means that whereas bacteria are readily accessible to the antibodies in the body humours, viruses are protected from them as long as they are intracellularly placed. Only when the infected cells die and break down discharging their virus content and the viruses are in transit to new cells, are they exposed to the action of antibodies. We do not yet know how virus antibodies act in vivo. Bacterial antibodies so alter the bacteria as to render them an easy prey for the phagocytes; the antibodies and the phagocytes act in conjunction in combating infection. But there is no evidence that the phagocytes play any part in virus immunity. All we know is that when a virus is sensitised by the appropriate antibody, either it is unable to get inside cells and so cannot multiply or, if it does get inside, the antibody has so altered it as to render it incapable of multiplication.

Is the solid immunity which so often results from virus infection due to persistent infection? Is it not true that that persistence of infection may actually be detrimental in that it renders the individual more susceptible to reinfection?

Professor BEDSON: "It is known that under experimental conditions clinical recovery from a virus infection may not represent a complete recovery; a residual infection is left which may persist for a considerable time. Such a residual infection would presumably be kept going by the occasional breakdown of an infected cell with the liberation of virus and the infection of a few new cells. The repeated antigenic stimuli so provided would maintain a high antibody level and so a high degree of immunity. One is tempted, therefore, to conclude that the solid and lasting immunity which is left by so many virus infections is the direct result of persistent infection. The life-long duration of the immunity which is left after recovery from diseases like smallpox or yellow fever make some hesitate to accept this view since they think it unlikely that the infection with these viruses would persist so long. There is no evidence that persistence of a virus infection renders an individual more prone to reinfection. An apparent exception such as herpes is apparent only since, with the exception of the primary infection, which occurs in infancy, the virus responsible for the attack of herpes is carried by the sufferer."

ROYAL ACADEMY OF MEDICINE IN IRELAND

A MEETING of the section of obstetrics was held on March 26. Dr. EDWARD SOLOMONS and Dr. J. D. H. WIDDESS discussed their observations on

Antispasmodics and Uterine Muscle

In view of the statement that dysmenorrhœa might be relieved by drugs relaxing uterine muscle they gave a preliminary report on the possible action of 'Trasentin' (Ciba), 'Syntropan' (Roche) and pethidine hydrochloride (Roche and Abbott). The drugs were used clinically, and experimental work was carried out on the human uterus in vivo by the intra-uterine balloon technique as described by Chassar Moir. Further observations were also made on human uterine muscle (removed at operation) and animal uteri in vitro. These experiments have so far shown that:

(*a*) Trasentin definitely causes relaxation and diminution of contractions in the uteri of the rabbit and guineapig and of the human subject in vitro, but this effect could not be observed in the human uterus in vivo.

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(*b*) Syntropan, as far as the limited supplies available were used, shows similar effects.

(*c*) Pethidine hydrochloride invariably stimulated the uterine muscle of the guineapig and rabbit in vitro, causing an increase in the force and frequency of contraction. In most experiments on the human uterus in vivo this drug caused a slight increase in tone and frequency of contraction.

Clinically, in a small series of cases, neither trasentin nor syntropan proved satisfactory in the treatment of dysmenorrhœa, and trasentin definitely produced drying of the mouth and unpleasant eye symptoms. On the other hand, pethidine hydrochloride gave relief in 60% of the cases in which it was used, a result probably to be explained by its central action as an analgesic. All the cases of dysmenorrhœa selected for this investigation were normal on gynæcological examination.

During the investigations carried out by the balloon technique no relationship could be observed between the powerful contractions of the uterus occurring naturally or produced by stimulation with pituitrin, and the pain sensations experienced by the patient. Neither could it be shown that contractions during menstruation in patients suffering from dysmenorrhœa were any greater than those observed in normal subjects.

Prof. O'DONEL BROWNE thought the introduction of a foreign body into the uterine cavity might produce some abnormality, and so might dilatation of the cervix. Even if the test was done with the patient under an anæsthetic, he said, it was bound to upset uterine action for a considerable time.—Dr. BETHEL SOLOMONS suggested that kymographic tracings could be taken in association with the Rubin apparatus to demonstrate if, and how, these drugs acted on the fallopian tubes.

Prof. W. J. JESSOP asked whether there was any difference between the action of these drugs when injected intramuscularly and injected into the uterus.—Dr. TIMOTHY HEALY described cases of dysmenorrhœa treated by dilatation of the cervix, or by belladonna, without effect. Pethidine tablets seemed to do more good than anything else that he had tried. One of his cases was made ill with morphia, but there had been no ill effects with pethidine. He asked why a patient with this apparent idiosyncrasy to morphia should not be upset by pethidine.

Dr. SOLOMONS replying said that it is thought that pethidine may take the place of morphia, having its advantages without its disadvantages. There is a difference of opinion about causes of dysmenorrhœa, but it is generally thought that hypercontraction of the uterine muscle is the cause—whether due to ischæmia or hormonal action, or to inflammation of the nerve-supplies in the uterus. The dilatation of the cervix and insertion of the balloon probably has some stimulating effect, but to fill the uterus properly it would be difficult to make the balloon smaller. Pituitrin had been given to some cases in his series and not to others. There is no difference between putting it into the uterine muscle and giving it hypodermically. Pethidine by mouth is an advance in analgesia and will be an advance on other drugs in the treatment of dysmenorrhœa and spasm.—Dr. WIDDESS said that it was important to investigate the actions of these antispasmodic drugs on the human. A great deal has been done on animals. Pethidine stimulates the uterine muscle, but the results of pethidine in dysmenorrhœa must be due to the central analgesic action which is one of the main therapeutic effects.

Reviews of Books

Biological Control of Insects

HUGH NICOL. (Penguin Books. Pp. 174. 9*d*.)

THE biological control of insects provides grand material for a popular book of science. The interest is so many-sided. Those who like adventure will find it in the voyagings of entomologists in search of parasites; in the famous odyssey of Muir who finally rescued the sugar industry of Hawaii, or the still earlier journeys of Koebele which saved the citrus groves of California. A more recent expedition was that of Simmonds, who got away from France in the last boat leaving Bordeaux before the entry of the Germans, taking with him a few new parasites of the codling moth of which great things are expected. But such adventures would be of little profit without an intimate knowledge of the natural history of the creatures concerned, based on skilled and patient study. At every point the story throws new light on the complex interrelations of living things. The book goes beyond the strict limits of its title and deals with the control of plants; with the dramatic reclamation by the help of insects of hundreds of square miles of Queensland which had been overrun by the prickly pear, and even with the control of weeds in lawns and pastures by differential manuring. The whole is written in a loose but lively style which holds the attention of the reader.

There have been no triumphs of medical importance in the control of insects by parasites; but deliberate alterations in the environment are being increasingly used to limit the numbers of many anopheles mosquitoes; and the medical reader cannot fail to reflect to what a great extent he employs this method. He does more than "amuse the patient while nature effects a cure"; by the exhibition of bacteriostatic substances such as sulphonamides or penicillin he deliberately upsets the balance between host and parasite.

Year Book of General Medicine, 1942

Editors: G. F. DICK, MD, and others. (Year Book Publishers; H. K. Lewis. Pp. 848. 19*s*.)

THIS volume, one of the series founded in 1900 by G. P. and C. J. Head, and published continuously since then, is divided into sections on infectious diseases, diseases of the chest, blood, head and vessels, and digestion. Many hundreds of papers published in 1941 and 1942 are summarised, and the range of selection is wide. The value of the individual articles is uneven but material presented in this way can be quickly revised and such yearbooks save much time for busy doctors. In general the tone is critical but the editorial comments are not always as helpful as they might be. Some of the more trivial papers could well have been omitted, but full justice is done to all important new work on the sulphonamides, penicillin, the anæmias, and many aspects of war medicine. The statistical surveys, and summaries of new theories make this a serviceable textbook.

Vitamins and Minerals for Everyone

ALIDA FRANCES PATTEE, former instructor in dietetics, Bellevue, Mt. Sinai, N.Y.; with HAZEL E. MUNSELL as technical adviser. (Putnam. Pp. 242. 10*s*.)

STILL another American book on dietetics, and this time by one who has had much experience in teaching dietetics to nurses in many hospitals in the USA and Canada and is author of three books already on that subject. This one is addressed to the lay public. It is popular in style, tells anecdotes, and uses all the panoply of the printer's art. In fact the book is beautifully produced, is illustrated by excellent photographs of animals suffering from different deficiency diseases, has good tables of vitamin and inorganic contents of foods—ranged both alphabetically and in order of magnitude—and is dogmatically sound and soundly dogmatic. It deserves a place on the bookshelf of any teacher of dietetics.

Surgery of Pancreatic Tumours

ALEXANDER BRUNSCHWIG, MS, MD, FACS, professor of surgery, University of Chicago. (Kimpton. Pp. 421. 37*s*. 6*d*.)

IT is only of recent years that surgical interest in tumours of the pancreas has been awakened. This book reviews the whole subject, including the historical aspect, the anatomy, physiology and what experimental work has been done. Professor Brunschwig has had a considerable experience in this field of surgery, so that his descriptions of operative technique are authoritative. The patient with a tumour of the ampulla of Vater, of the head or body of the gland, or with an islet-cell tumour now has a distinctly better chance of survival after a surgical operation than his forerunner a few years ago. The book is useful, interesting, and well illustrated.

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[1] *British Medical Journal*, 1935, November 16th, p. 938.
[2] *British Medical Journal*, 1938, January 15th, p. 105.

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THE LANCET

LONDON: SATURDAY, MAY 15, 1943

THE BURN AS AN OPEN WOUND

In an age of increasingly mechanised warfare the burn has become a major hazard for the man on active service, whether he be in a ship, a tank, an aeroplane or a Civil Defence uniform. These burns are mostly treated in open wards alongside other surgical conditions. It is therefore desirable that the principles of treatment should approximate to those of the open wound, and that surgical and nursing staff should not be hampered with techniques that are difficult to learn and tedious to apply. Surgeons are apt to look on the burn as something apart, and to devise all manner of special treatments; surely it is more reasonable to regard it, except for the extensive damage to epithelium, as akin to the lacerated open wound, and to treat it on similar lines? That being so, the objectives in the treatment of a burn are to prevent and combat shock, to convert the contaminated wound to a clean one, to cover the wound so as to protect it from infection (allowing drainage but preventing excessive loss of fluid), to rest the injured part, and to promote healing in the minimum time and with minimum loss of function. Initial shock, if present, can be countered by warmth, rest and, above all, by administration of morphine for the relief of pain. If oligæmic shock supervenes it must be treated without delay by transfusion of plasma or serum in quantities sufficient to maintain a normal blood-pressure. About such measures there is general agreement; it is in the local treatment of burns that the surgical paths diverge.

Adhering to the principles laid down, our first duty is to convert the contaminated wound to a clean one. This must be done in the theatre or dressings room with all the strict ritual of a surgical operation. The wearing of masks is particularly important, for the large abraded surface is very susceptible to droplet infection. The wound *and* the surrounding skin may be cleaned with a plentiful supply of soap and water added to patience and gentleness; but where there is oil or tar or ingrained dirt a stronger detergent is needed and the new CTAB seems to be excellent for the purpose.[1] But we must remember that the antiseptic properties of CTAB are much reduced by mixture with organic material, and if antiseptics are to be applied at this stage the aminoacridines[2] would probably take pride of place. The next stage is to cover the clean wound so as to protect it from fresh infection and prevent further loss of fluid, which occurs not only from the burnt surface but also into the surrounding subcutaneous tissues. Undoubtedly tannic acid, alone or with silver nitrate, does this job well, even if secondary infection follows in a proportion of cases. The pros and cons of tanning are discussed by LOGIE at p. 609. Its main disadvantage is that the eschar separates very slowly and so delays healing or prevents early skin-grafting. Many alternatives, including antiseptic dyes and, lately a "prefabricated" sulphonamide eschar[3,4] and, for localised scalds and burns, hexene-ol,[5] have been tried without obvious improvement. ALLEN and KOCH[6] prefer a pressure dressing consisting of first a few strips of fine-mesh paraffin-gauze which does not adhere to the wound and allows drainage, followed by half a dozen layers of dry gauze and then a mass of gauze fluff topped by mechanics' waste or sea-sponges to provide a resilient covering under an elastic retaining bandage of stockinette. This purposeful pressure applied over a burn eliminates any dead space, controls oozing of fluid and prevents lymph stasis. Next, to ensure rest, splints or a plaster cast should be applied if the affected part is a limb, care being taken, as emphasised by BARNES,[7] and by BODENHAM,[8] to see that the limb is fixed in a "position of function" and elevated to prevent swelling and pain from lymph and venous stasis.

The next stage in treatment is the promotion of rapid healing, which is facilitated if epithelial buds from sweat-glands and hair follicles are not rendered inert by a coagulating agent, if infection is prevented, and if regenerating epithelium is not torn away by too early or careless removal of the protective dressing. Where the skin is not wholly destroyed, epithelialisation may be expected in 10–14 days and the first dressing should if possible be left intact until that time. If, however, the whole thickness of skin is destroyed, the epithelium can regenerate only from the edge and this is a slow affair. Secondary infection is a likely complication. The objective now must therefore be to get rid of gross infection from the granulating surface so that skin-grafts may be successfully applied, and for this purpose wet dressings of eusol or Dakin's fluid are popular. The burns team at the Glasgow Royal Infirmary show in our present issue that penicillin, made into a cream with Lanette wax SX and castor oil, and applied four times at 48-hour intervals, is excellent for ridding granulating wounds of streptococcal and staphylococcal infection; in 7 instances the infecting streptococcus was sulphonamide-resistant. Propamidine as a 0·1% cream was less successful. The drawbacks to penicillin, apart from its present scarcity, are that it, like so many other antiseptics, is relatively ineffective against coliform bacilli, proteus and pyocyaneus, and that it is unstable—the cream deteriorates after 15 days at room temperature. It is, however, preferred to powdering with sulphanilamide, which requires daily painful dressing with disturbance of the regenerating epithelium; sulphanilamide cream was found to be less effective.

Infection is still the great bogy in the treatment of burns. R. CRUICKSHANK showed in the same Glasgow wards 10 years ago that most burns become infected with hæmolytic streptococci after admission, and the problem is how to prevent this secondary infection of large abraded surfaces. The infected burn, despite the surgeon's scepticism, not only heals slowly and may at any time be followed by serious complications,

1. Barnes, J. M. *Lancet*, 1942, i, 531; Williams, Clayton-Cooper, B., Duncan, J. McK. and Miles, E. M. *Ibid*, April 24, 1943, p. 522.
2. Browning, G. H. *Brit. med. J.* March 20, 1943, p. 341.
3. Pickrell, K. L. *Bull. Johns Hopk. Hosp.* 1941, 69, 217; 1942, 71, 304.
4. Clark, W. G., Strakosch, E. A. and Leven, L. N. *J. Lancet*, 1942, 62, 455.
5. Levine, B. *Amer. J. med. Sci.* January, 1943, p. 125.
6. Allen, H. A. and Koch, S. L. *Surg. Gynec. Obstet.* 1942, 74, 914; See also Siler, V. E. and Reid, M. R. *Ann. Surg.* 1942, 115, 1106.
7. Barnes, J. M. *Brit. med. J.* April 3, 1943, p. 408.
8. Bodenham, D. C. *Lancet*, March 6, 1943, p. 298.

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but—even more important—is a menacing source of infection to every newly-admitted wounded patient as well as to nursing staff. Hence it may be unwise to concentrate burns in one ward and thus risk increasing the load of infection unless a very high surgical and nursing standard can be maintained to minimise cross-infection, or there are more facilities than exist at present for the isolation of infected cases. We still do not know which is the most likely vehicle of spread in the infection of wounds—droplets from the unmasked surgeon or nurse, the hands or instruments of the dresser unversed in the no-touch technique, or the infected air and dust of the ward. Until we do, and take rigorous steps to control them, infection of burns will still occur.

THE SIZE OF LOCAL HEALTH AUTHORITIES

THE furthest the MINISTER OF HEALTH has so far allowed himself to go in defining the administrative areas of the projected National Health Service is "units large enough to allow scope for efficient planning and effective execution."[1] It will be interesting to hear more definitely what size of area he has in mind.

There is of course no inherent virtue in any particular size of administrative unit. Size must be seen in relation to function. Water-supply and sewage disposal, for example, must be planned over large areas if geographical factors are to be taken into account and if the inhabitants are to get the best service in the most economical way. It is admitted by those in a good position to know—namely, the officers of local government themselves[2]—that the major defects of our present system are, first, the existence of a large number of small local authorities, lacking the population, money or qualified staff to supply adequate services, and, secondly, the lack of coöperation between authorities. The solution they offer in the NALGO report is the creation of an increasing number of "all-purpose" authorities of the county-borough type, generally serving populations of 100,000–500,000. These authorities would send representatives to larger regional or provincial councils, which would be responsible for all large-scale planning and coördination. The provincial council would have no direct executive or administrative powers, but its recommendations would be binding on the all-purpose authorities. The question that concerns us here is how such arrangements would affect a national health service. A grave danger, as we see it, is that any attempt by a population of a few hundred thousand to become medically self-sufficient might hinder the development of necessary specialisation. There is a risk that the patient in the new all-purpose authority's all-purpose hospital would have to have his thyroid, colon, and empyema dealt with by the same general surgeon. Yet it is common knowledge that specialised surgical skill, based on practice and a large turnover, can cut the mortality of these major operations by a quarter or a half. Great as the objections to excessive specialisation may be, a return to the general specialist, for the sake of placating the local authorities, cannot be contemplated.

An alternative would be the scheme put forward in the report of Medical Planning Research,[3] adapted to the new local authorities. Each all-purpose authority would maintain its hospital or medical centre—but as a first line of defence in a regional hospital plan. It would care for fevers, the minor sick, the chronic sick, the normal confinement, and acute emergencies, but its outpatient clinics would be staffed by visiting specialists based on a major key hospital. All serious cases, other than emergencies, would be transferred to the key hospital where they could receive the attention of specialists who specialised, and the key hospital itself would be run in conjunction with, and feed, the necessary sanatoriums and rehabilitation hospitals. The difficulty, however, at once arises: who is to be responsible for these key hospitals? And is it really inevitable that there should be a point at which the patient passes from the hands of one authority into those of another?

The objections to smallish independent health authorities, such as NALGO envisages, are serious, and the difficulty of coördinating their activities would be great. The MINISTER, we feel sure, is well aware that sound hospital practice throughout the country cannot in fact be achieved without regional planning and administration of the hospital services. This was the central theme of the Ministry's first medical advisory committee in 1920, and has slowly but surely been accepted by the medical profession as the only sound policy. To give "scope for efficient planning and effective execution" the administrative areas of the new health service must be far bigger than all but the biggest of the existing units of local government.

TYPHUS—EPIDEMIC AND "HYPERENDEMIC"

WITH typhus seemingly on the increase in Eastern Europe and in North Africa, many must be wondering where it is likely to stop—what risks there are of an epidemic in Western Europe. Certain conditions are necessary before a bad epidemic can occur: the presence of the typhus rickettsia; a population which is at once reasonably lousy and reasonably susceptible; and probably the presence of hunger or other severe hardships. Dr. YVES BIRAUD, of the Epidemiological Intelligence Service at Geneva, has written a useful monograph[1] on the subject, containing much food for thought. He shows that in Poland and the Balkans typhus has been increasing since the war to an extent which may be summed up as disquieting, but not alarming. Sporadic foci have been appearing in Germany and Hungary in areas which are normally free from the disease; presumably the infection has been brought in from the Eastern front. In Spain typhus showed an increase in the years up to 1941, and it was still prevalent in 1942. Its doings in North Africa must be of particular interest to us in these days. There, it is always present, but rises when economic conditions are bad. These depend as a rule largely on an adequate rainfall, but have been made much worse lately by the abnormal conditions which followed the fall of France. "The figures for 1941 are more than double those recorded in any of the preceding twenty years and those for the beginning of 1942 exceeded them again markedly."

The striking feature of the recent typhus in French North Africa has been its comparatively even distribution over endemic areas, a distribution leading

1. *Lancet*, 1943, i, 448. 2. *Ibid*, p. 246. 3. *Ibid*, 1942, ii, 599.

1. The present menace of typhus fever in Europe and the means of combating it. By Y. Biraud. *Bull. Hlth Org. L. o. N.* 1943, 10, No. 1.

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BIRAUD to call it a "hyperendemic" rather than an epidemic. It will be recalled that ZINSSER always maintained that the typhus of urban New York and Boston, the so-called Brill's disease, was due to epidemic or European virus rather than to the murine virus which is endemic in the southern United States. It is found almost wholly among immigrants from Eastern Europe, and ZINSSER held that it represented a recrudescence of infection contracted in earlier years and lying dormant in the meanwhile. In much the same way, SERGENT thinks, typhus may be a latent infection in man in North Africa, the host-parasite balance becoming upset by hunger and hardship. In support of this view may be urged the appearance of sporadic typhus in central and southern France; this has been almost wholly in arrivals from North Africa, not only in recent arrivals, but also in natives from those countries working in France. There has been very little spread to native Frenchmen. One can readily imagine how a "hyperendemic," by widely seeding the infective agent in a community, could prepare the way for a true epidemic in a wholly susceptible population living in the same area.

Defence against typhus will clearly involve measures of quarantine, louse-control and the relief of destitution. What is the place of vaccines in supplementing these measures? BIRAUD very fully reviews the evidence for and against the numerous vaccines which have been tried. He also gives details of the techniques for their preparation. Of killed vaccines, whether made from rickettsiæ grown in louse-gut (Weigl's) or on yolk-sacs or in rodent lungs, there is not much new that can be said. Weigl's is certainly of value, but admittedly cannot be prepared on a very large scale. The others are being studied all over the world, but the evidence as to their practical usefulness is not yet available. In North Africa, BLANC and LAIGRET have evolved vaccines which are very different, but resemble each other in containing living murine rickettsiæ.

One strong argument which the French have used in favour of a living vaccine in North Africa is that, in practice, it is not feasible to immunise the native population by any method involving more than one injection. But what is justifiable and safe for a salted population may be unwise for Europeans, in whom "vaccinal typhus" is more apt to occur and may be a more serious disease. The recipe for making Blanc's vaccine runs: "Take 50,000 rat fleas, add two typhus-infected rats . . ." and so on; ultimately you have 10 g. of flea fæces. The virus is dried and treated with bile just before use. There is no claim that the biliated virus is permanently attenuated, only that in practice it rarely causes vaccinal typhus. Laigret's vaccine is made from brains of rats, and more recently mice, infected with murine typhus; formerly an oily excipient was used, but this has now been replaced by water. It is claimed that 220,000 people have been lately inoculated without any vaccinal typhus developing. Though much more evidence has been put forward for the efficacy of these live vaccines than for killed ones, there are good reasons for hesitating to accept them for general use. The results are apparently inconstant, perhaps because of difficulties in standardisation; comparatively little is known of the use of these vaccines in Europeans; there is not such convincing evidence as we have for the virus used for yellow-fever inoculation, that a stable attenuated strain is to hand, and the Blanc vaccine, one must admit, does not sound a very "elegant preparation." Nevertheless it is good to know that this work is going on; one can imagine a situation on the European Continent in which an attenuated living vaccine would help to gain control when killed vaccines would be neither available nor applicable.

DICOUMARIN FOR THROMBOSIS

IN 1933 the preparation of relatively pure samples of heparin that could safely be given to patients to make their blood less coagulable led to experiments to determine how useful heparin would be in pathological thrombosis, both primary and following embolism. The results[1] showed that such an anticoagulant action was indeed desirable, but the use of heparin has not been popular for several reasons. In order to keep up the effect, heparin has to be given by continuous intravenous drip, or at least by intravenous injections every 6 hours, and the expense of maintaining a patient on heparin for a long enough period is large; samples of the drug vary greatly in activity and the dose is therefore difficult to determine; finally, there have been several disasters in patients with subacute bacterial endocarditis being treated with sulphonamides and heparin. In 1941 K. P. LINK of Wisconsin isolated the hæmorrhagic agent of spoiled sweet clover and showed that it was 3:3'-methylene-bis-(4-hydroxycoumarin); or briefly "dicoumarin." He succeeded in synthesising dicoumarin, so that a pure preparation was available for experiment, and we now have useful information about its properties.

Given by mouth in gelatin capsules, dicoumarin reduces the coagulability of the blood within 24–48 hours of the first dose. The effect appears to be an inhibition of prothrombin and an interference with clot retraction. Like heparin, it will prevent experimental thromboses.[2] If large doses are given bleeding may occur, but no toxic side effects have so far been noted. The dose must be controlled by daily prothrombin-time estimations—coagulation-times are unreliable—and most workers have found QUICK'S technique, using thromboplastin prepared from rabbit brain tissue,[3] most reliable; some minor modifications have been proposed. The object is to keep the prothrombin time—normally 11–12 sec.—between 35 and 60 sec.; the dosage suggested by ALLEN, BARKER and WAUGH[4] is 300 mg. on the first day, 200 mg. on the second, and then 200 mg. on each day the prothrombin time is less than 35 sec. When dicoumarin is stopped, the effect lasts 3–7 days; the possibility of hæmorrhage needing control has therefore to be faced, and experience has shown that transfusion of *fresh* blood or serum is the only effective measure; stored blood is less effective owing to loss of prothrombin, and vitamin K is useless. Contra-indications to dicoumarin are renal insufficiency, liver disease, subacute bacterial endocarditis, deficiency of vitamin K, and pregnancy and the first 5 days of the puerperium.

These properties certainly suggest that dicoumarin

1. *Lancet*, 1941, ii, 314.
2. Dale, D. O. and Jaques, L. B. *Canad. med. Ass. J.* 1942, 46, 547.
3. Quick, A. J. The Hæmorrhagic Diseases, Springfield, Ill., 1942, p. 312.
4. Allen, E. W., Barker, N. W. and Waugh, J. M. *J. Amer. med. Ass.* 1942, 120, 1009.

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could replace heparin with advantage and several workers have already demonstrated that it can. On another page LEHMANN of Gothenburg describes his experiences with 100 established cases of various types of thrombosis in the leg and with 170 patients who had dicoumarin prophylactically before gynæcological operations. He used larger doses than the American workers and is thoroughly satisfied with the results; the thrombosis cases recovered much more rapidly than was usual in Sweden before anticoagulants were introduced, and the drug significantly reduced the incidence of postoperative thrombosis and embolism in the gynæcological patients. Like others, LEHMANN notes hæmorrhages in about 10% of patients, but in his series it was never severe and always controllable. ALLEN and his colleagues report on 368 cases of arterial or venous thrombosis or pulmonary embolism and they also are impressed by the value of dicoumarin in preventing extension of thrombosis. They started dicoumarin 24 hr. after operation in patients judged likely to develop thrombosis; 124 cases of abdominal hysterectomy were so treated and none had subsequent thrombosis or embolism, although from previous experience some might have been expected. One of the difficulties they note is the time dicoumarin takes to get into action and this first 24 hours after a thrombosis is a most important period; intravenous injection of the unstable disodium salt still shows this latent period and LEHMANN [5] has tried other coumarin derivatives without success: it is therefore proposed to give heparin by the 6-hourly intravenous method of CRAFOORD and JORPES [6] during the first 24 hours while the dicoumarin is coming into action. How far is the hæmorrhage-producing property of dicoumarin a disadvantage? All agree that it must be treated seriously. WRIGHT and PRANDONI [7] have recorded some unpleasant experiences—one patient, for example, had purpura, bleeding gums, hæmaturia and hæmatemesis, but recovered after transfusion. They note that bleeding at a venipuncture site is an ominous sign and should be the signal for transfusion. ALLEN and his colleagues noted hæmorrhages, a few serious, in about 10% of patients. DAVIDSON and MACDONALD [8] have shown that dicoumarin is only effective when it has reduced prothrombin to about 30% of normal, and they were troubled by the variable effect that a given dose had on different patients; they report a case in which blood-transfusion failed to influence the low prothrombin time produced by dicoumarin. They were unfavourably impressed with the drug for the reason that, in their experience, reliable control of possible hæmorrhage has to be sacrificed if it is to be effective; but their series of cases is small, and no serious bleeding occurred among them except in a patient with endocarditis lenta. It is clear that if dicoumarin is to be used, it must only be where facilities for daily prothrombin times by a proper technique exist; the halting of a spreading thrombosis threatening loss of a limb or worse is worth some risk of hæmorrhage, so long as means for proper control of dosage and for stopping bleeding are at hand. In the discussion of the American results, OCHSNER [9] of New Orleans raised an interesting point: if we pay too much attention to anticoagulants, he asked, are these patients going to develop emboli? Experience in subacute bacterial endocarditis has shown that this is a pertinent question, and this and other risks must be more definitely evaluated before dicoumarin can be recommended for general use.

5. Lehmann, J. *Lancet*, 1943, i, 458.
6. Crafoord, C. and Jorpes, E. *J. Amer. med. Ass.* 1941, **116**, 2831.
7. Wright, I. S. and Prandoni, A. *Ibid*, p. 1015.
8. Davidson, C. S., MacDonald, H. *Amer. J. med. Sci.* 1943, **205**, 24.
9. *J. Amer. med. Ass.* 1942, **120**, 1025.

Annotations

SUCCESS IN TREATMENT OF PNEUMONIA

FROM the mass of papers on the chemotherapy of pneumococcal pneumonia that have appeared in the past five years two important conclusions emerge. With the proper use of sulphapyridine, sulphathiazole or sulphadiazine the gross fatality-rate is now in the region of 10 per cent.; and of the three drugs, sulphadiazine is to be preferred because its toxic effects are least. But although the results of chemotherapy are undoubtedly spectacular, 10 per cent. is still a sizeable fatality-rate and it is natural to inquire whether it cannot be further reduced. Recent papers by Flippin, Schwartz and Domm [1] and by Meakins and McKenna [2] illustrate this attitude. The chances of survival are considerably reduced if the age is over 40, if there is bacteræmia or if the infection is with type III organisms. The combined use of serum and sulphonamides may reduce the mortality in bacteræmic cases, but the discovery of a sulphonamide more effective against type III organisms seems to offer the best chance of lowering the figure below 10 per cent. Flippin and his colleagues emphasise another point that should be taken to heart by all practitioners. In their opinion "the length of time that elapses between the onset of the infection and the beginning of specific treatment is the most important single controllable factor in the prognosis of pneumococcic pneumonia." The onset of pneumonia is quite characteristic in the great majority of cases, and the doctor who waits for the confirmatory evidence provided by X-ray examination or signs of consolidation before instituting chemotherapy is exposing his patient to needless risk.

PYRIDOXINE DEFICIENCIES

A FEW years ago it looked as though Dean Swift's witticism about the fleas might also turn out to apply to the B's, since they seemed capable of subdividing ad infinitum. The outlook is now more promising and recent work goes to show that animals can be reared on diets in which all the B vitamins have been added in the form of fine chemicals. Naturally this has led to a rapid advance in our knowledge of the function of these substances, and pyridoxine deficencies in various species are now beginning to be characterised. It will be recalled that Chick and her colleagues in 1938 [3] showed that pigs fed on a selectively purified diet developed an anæmia and had epileptic fits, and that both these signs could be relieved with extracts of liver and of yeast which were known to contain pyridoxine. Dogs on a diet deficient in this vitamin have also been shown to develop a microcytic anæmia; but pyridoxine, although temporarily efficacious, has not so far been found to effect a complete and permanent cure.[4]

The experiments of Wintrobe [5] have been on pigs. They find that a pure pyridoxine deficiency leads to a severe anæmia of the microcytic type, a rise in the serum iron and an accumulation of iron in the spleen, liver and bone-marrow. It is interesting that here again

1. Flippin, H. W., Schwartz, L. and Domm, A. H. *J. Amer. med. Ass.* 1943, **121**, 230.
2. Meakins, J. C. and McKenna, R. D. *Canad. med. Ass. J.* 1943, **48**, 104.
3. Chick, H. et al. *Biochem. J.* 1938, **32**, 2207.
4. McKibbin, J. M. et al. *J. Biol. Chem.* 1942, **142**, 77.
5. Wintrobe, M. M. et al. *Bull. Johns Hopk. Hosp.* 1943, **72**, 1.

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the body seems to have little tendency to excrete iron even if it is for the moment quite unable to use it—a fact which has been emphasised by McCance and Widdowson [6] in their theory of iron metabolism. Administration of pyridoxine produces a reticulocyte response, mobilisation of the iron, and cure of the anæmia. Attacks of grand mal and petit mal are also produced in the pigs by pyridoxine deficiency and these can be prevented by giving the pure vitamin. Prolonged lack of pyridoxine leads to a fatty infiltration of the liver.

In discussing these effects Wintrobe and his associates point out that there are features in common between some of the human anæmias and the one caused by a pyridoxine deficiency, but that there is no evidence at present that pyridoxine anæmias ever occur in man. Disappointing as this may sound to those who are interested only in therapy, the discovery of this new anæmia and the other symptoms of pyridoxine deficiency must be of great interest to anyone whose attention is focused on the physiology of the blood-forming organs or of the nervous system, and to many others. It is evident that pyridoxine has widespread functions in the body and its study has already revealed that many reactions must have been going on in the cells of which we were not in the least aware. Once again pathology looks like making a major contribution to physiology.

FURTHER INVESTIGATION OF HEPATITIS

INFECTIVE hepatitis has been a serious nuisance during the past three years. The widespread outbreaks are attributed to a virus, and the question arises whether this hypothetical virus is not also responsible to some extent for the jaundice seen in VD clinics, and occasionally in TNT factories: may it not cause hepatitis by attacking livers already affected by arsenical drugs or liver poisons? Much useful information has been gained from the occurrence of jaundice in a number of children passively immunised with mumps and measles convalescent serum and in soldiers actively immunised with yellow-fever vaccines. But some of the facts do not fit into the expected pattern and more facts are needed to explain them. It is welcome news therefore that the Medical Research Council, acting on a request from the Ministry of Health and in consultation with the War Office, have undertaken a special investigation into the causes of the present increased incidence of different forms of jaundice. The scheme is being generally directed by a committee of the council under the chairmanship of Prof. L. J. Witts and with Dr. A. M. McFarlan as secretary. The headquarters of the investigation have been established in the Department of Pathology, University of Cambridge, by arrangement with Prof. H. R. Dean. Cambridge is able to provide good laboratories and connexions with all branches of science, and is the centre of contiguous urban and rural populations of a size convenient for epidemiological study.

The team at Cambridge consists of five whole-time workers. The services of Dr. F. O. MacCallum as senior bacteriologist have been lent by the Wellcome Research Institution; Major Clifford Wilson (physician) and Capt. J. A. R. Miles (clinical pathologist) have been seconded from the RAMC; and Dr. McFarlan (epidemiologist) and Dr. M. R. Pollock (assistant bacteriologist) have been attached from the Emergency Public Health Laboratory Service. In addition, Prof. S. P. Bedson, FRS, is acting as general adviser on behalf of the committee. Prof. G. Hadfield has agreed to undertake the examination of histological material, and Prof. M. E. Delafield to collate epidemiological reports from various sources.

The efforts of the research team will be concentrated on the ætiology and exact laboratory diagnosis of infective hepatitis. This will probably include attempts to grow the virus in vitro, and also a search for a susceptible animal. Any information about hepatitis in animals, whether spontaneous hepatitis of the infective type or jaundice following the use of serum, would no doubt be of great interest to the committee.

6. McCance, R. A. and Widdowson, E. M. *Lancet*, 1937, **2**, 680.

OXFORD HONOURS JOSEP TRUETA

OXFORD University has transferred Josep Trueta from town to gown by giving him a DSc honoris causa. Just before this war began Trueta described his careful studies of wounds in the Spanish war,[1] and thus provided us with a rationale of treatment tested and proved effective. He had treated in Barcelona 1073 cases, with 6 deaths, by what became known as the closed plaster method. The fundamental conception of Trueta's work was a profound respect for the natural healing power of living tissues. He stressed that dead tissues have no defence, so the surgeon must excise them; the bleeding edge is the first assistant and the most important collaborator of nature. Excision of wounds was practised in the last 18 months of the last war, although its main purpose was looked upon as the erasion of infecting organisms. For this reason it was backed up by antiseptic lavage and frequent dressings, and the surgeon still preened himself as the knight rescuing the weakling Nature from the giant Bug. Nor was the need for absolute immobilisation completely appreciated. Winnett Orr was to show that the draining infected wound in osteomyelitis can be left to the unassisted natural powers of healing, provided immobilisation is adequate. Trueta was to confirm this in war work. Plaster-of-paris came to be used because it was a convenient immobilising agent; Trueta has shown that it casts no magic spell and does not excuse us from observing the established surgical principles. Working with Barnes in Oxford,[2] he has established the theoretical foundations of immobilisation in plaster. The flow of lymph was the clue. They showed that when a limb is immobilised the flow of lymph almost ceases and infection is thus localised. Beyond this, since he came to live in England, Trueta has worked on vascular spasm on war burns, and is at present acting as surgeon in charge of the accident service at the Radcliffe Infirmary; he has recently written a striking book on war surgery.[3] The war has provided all the evidence needed to ensure general acceptance for the plaster method of wound treatment, in the introduction of which due deference is paid by Trueta himself to Winnett Orr. Treatment of a wound is no longer harrowed by frequent dressings, with their risk of secondary infection; secondary hæmorrhage, so common in the last war, is almost unknown in this. In the actual healing process the surgeon has become most of the time merely one of Nature's keen supporters.

SKI INJURIES

THE Finns and the Russians taught us the military importance of skiing, and it no longer startles us to hear of British troops learning to ski in the Algerian Alps, and of the activities of the American mountain corps. Moritz [4] has had an ideal opportunity of studying ski accidents in Sun Valley, Idaho, where all medical facilities are under one head. In three years there were 1373 casualties, of which about half were minor sprains and strains with an average disability period of about 4 days. Most of these were sprains of the ankle or of the medial ligament of the knee, these two injuries often occurring together. There were 261 contusions and lacerations, and 257 fractures. Of the fractures three-quarters affected the lower limb, as might be expected, and of these about two-thirds concerned the fibula—in fact, the commonest fracture was of the lower end

1. *Lancet*, 1939, i, 1452. 2. *Ibid*, 1941, i, 623.
3. Principles and Practice of War Surgery, London. 1943. Pp. 391, 42*s*.
4. Moritz, J. R. *J. Amer. med. Ass.* 1943, **121**, 97.

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of the fibula. This fracture, like most ski injuries, is due to a torsional strain. The foot is immovably fixed to the ski by the binding. When the ski is suddenly stopped by sticky and heavy snow, or by some solid object, the runner falls to the side and forward. At this moment his knees are usually bent, and weight-bearing is at a minimum. In most cases the strain is one of lateral rotation only. Bimalleolar and trimalleolar fractures are uncommon, but care has to be taken to exclude tibiofibular diastasis. Fractures of the shaft of the tibia, with or without the fibula, were fairly common, but other lower-limb fractures definitely rare. There were some upper-limb fractures and dislocations of the shoulder. Moritz suggests that a binding that allows the foot to become disengaged on falling would reduce accidents in training and in warfare, though it would never be popular with winter sports enthusiasts.

"DAMAGED GOODS"

THE revival of Brieux's famous play on venereal diseases, at the Whitehall Théatre on May 6, comes at an opportune moment in the Ministry of Health's campaign to break down the taboos on the discussion of these diseases.

In the present version by Sir John Pollock, who originally translated the play in 1914, the scene is still laid in Paris; but the modern dress of the players seems somewhat inconsistent with a plot which hinges around the possible infection of a wet-nurse by a syphilitic infant, and on the VD specialist's refusal to allow an infected young man to marry for four years. There are also some inconsistencies in the doctor's remarks at various times about the chances of cure; and it would perhaps have been better either to have produced the play unchanged, as a period piece, or to have modernised it completely—perhaps an impossible task. Nevertheless, both as a play and as propaganda, *Damaged Goods* wears well, and the tribute paid to the author's honesty and skill in his translator's curtain-speech was well deserved. Mr. James Dale, as the doctor, makes the most of his enormous part and is well supported by the rest of the cast.

VITAMIN A, BONE GROWTH AND PRESSURE ON NERVES

Two vitamins, C and D, are known to play a part in the growth of bone. The former seems to be concerned chiefly in the laying down of the organic matrix, and the latter appears necessary for normal calcification. In the past there has been disagreement as to whether vitamin A also is required for normal bone growth. Sir Edward Mellanby [1] now provides evidence that in vitamin-A deficiency there is no cessation of bone growth, but rather a form of hypertrophy, and this suggests that the vitamin has a growth-controlling function. Previously he has drawn attention [2] to degeneration of cranial nerves in animals on a diet deficient in vitamin A and carotene. In 1938 he demonstrated [3] the effect of bone overgrowth in vitamin-A deficiency on the 8th nerve. The present work extends these observations and shows that degeneration of other cranial nerves associated with lack of vitamin A may be partly attributable to pressure caused by overgrowth of the bones of the skull. Several factors, he points out, are involved in such degeneration. Apart from direct pressure on the nerves, there may be restriction of the blood-supply to the nerve-cells and fibres; there may be increased intracranial pressure, also due to bone overgrowth; and there may also be some direct effect on the nerve-cell caused by the vitamin-A deficiency. It is noteworthy that in these A-deficient animals (puppies) the sensory nerves were affected more than the motor nerves. Mellanby believes that this is because the sensory nerves have ganglia which are situated outside the central nervous system and are therefore more likely to be compressed by overgrowth of bone in the skull; whereas only the axons of motor nerves can be subjected to pressure by overgrowing bone. The optic nerve is particularly affected by lack of vitamin A, but there is some doubt whether all the changes in it are the result of pressure by hypertrophied bone. The 5th and 8th nerves are also highly susceptible to degeneration in A-deficiency.

Mellanby's interesting observations suggest that in human beings this deficiency may play some part in the ætiology of certain affections of the ear and the eye. One may legitimately wonder, too, whether such conditions as trigeminal neuralgia and the bony exostoses of certain types of rheumatism may not be partly due to inadequate intake of vitamin A over a period of many years.

1. Mellanby, E. *J. Physiol.* 1943, **101**, 403.
2. Mellanby, E. *Edin. med. J.* 1933, **50**, 197; Nutrition and Diseases, Edinburgh, 1934.
3. Mellanby, E. *J. Physiol.* 1938, **94**, 380.

FACILITIES FOR CONSULTATION

THE Minister of Health thinks it desirable to remind general practitioners of the help that may be available in the treatment of their patients as the result of the redistribution of consultant services provided under the Emergency Hospital Scheme. Owing to the large measure of pooling of hospital resources under the scheme, additional consultants may be attached to the local hospital to which a practitioner has been accustomed to refer his patients, or at other hospitals with which this hospital is linked under the scheme and to which patients are transferred in accordance with arrangements made by the regional or sector hospital officer.

It is suggested that practitioners should familiarise themselves, if they have not already done so, with any additional facilities that have thus become available at hospitals in their area, and that they should make as much use of them as possible in appropriate cases. Should any practitioner find difficulty in informing himself of any such facilities the medical officer of health will be able to advise.

It is particularly important in the national interest that practitioners should have access to help of this kind in the case of young industrial workers up to the age of (say) 25. Some, for example, may be suffering from general debility following recent illnesses such as influenza or pneumonia, or showing signs of undue fatigue, and if they are failing to respond to treatment as well as the practitioner would wish, he may feel that a further opinion would be helpful.

ROYAL SOCIETY OF MEDICINE.—At 2.30 PM on Wednesday, May 19, at the section of physical medicine of this society, Dr. G. E. Donovan will speak on the adaptation of the double-beam cathode-ray oscilloscope to biology in medicine, Dr. E. J. Crisp on physical methods used in the treatment of feet, Dr. Gwen Hilton on the treatment of spondylitis ankylopoietica by X rays, and Mrs. Olive Guthrie Smith on rehabilitation by self-activated exercises. At the meeting of the section of dermatology on May 20, at 4 PM., cases will be shown. The section of neurology will meet at 4.30 PM on the same day to discuss immersion injuries and vasomotor disorders of the limbs in warfare. The opening speakers are to be Prof. J. R. Learmonth, Surgeon Commander C. C. Ungley and Dr. William Blackwood. At the meeting of the section of obstetrics and gynæcology on May 21, at 3.30 PM, Prof. W. J. Hamilton, Miss Gladys Dodds and Miss Josephine Barnes will read a paper on phases of maturation, fertilisation and early development in man, and afterwards Mr. C. McIntosh Marshall and Miss M. H. Mayeur will open a discussion on the lower-segment cæsarean operation. The section of radiology will hold their annual general meeting at 4.45 PM on the same day.

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Special Articles

CHILDREN IN OCCUPIED EUROPE

THE NEED FOR ACTION

Lord DAWSON presided over a conference in London on May 6 at which delegates from many organisations and public bodies considered the present plight of children in countries occupied by the Germans. Relief, he said, could best be brought by furthering the war effort and speeding victory; but meanwhile conditions were likely to get harder as the food situation deteriorated and the battle-front widened, and it was urgent to see what could be done.

Monsieur MICHAELOPOULOS, Greek Minister of Information, stated that the policy of starvation in Greece had been deliberate: the Nazi commander, resenting the "impudence" of the Greeks in resisting, had promised that those who were rich should become poor, and those who were poor should starve. This had happened. Seven months ago the Patriotic Institution in Athens, a well-managed place for child welfare, secured enough milk for 500 babies. The news, however, brought 2500 mothers with their infants, imploring a share, and the nurses had to decide whether to refuse these appeals and save the 500, or share the milk and probably save none: they chose the former course. With the arrival of 15,000 tons of Canadian wheat and some dehydrated vegetable in Swedish ships the general situation had improved. This food had been distributed by the Swiss and Swedish Red Cross and the Turkish Red Crescent, and the death-rate had fallen. The price of food being now prohibitive, the population depended almost entirely on public soup-kitchens. All but the strong had died. The immediate problem was one of transport. The Nazis were not taking the imported food, partly because they were now less certain of their position.

Monsieur EMILE CAMMAERTS said that Belgium, like Greece, had suffered famine because she depended on foreign supplies, having imported 70% of food and fodder in peace-time. During the last war 100,000 tons of foodstuffs had been imported from America, but in this war only about 1000 tons a month were going in, through Portugal. Against a normal average of about 2500 calories daily before the war, the Belgians now had 800–1100. In 1914–18, with rations equivalent to about 2000 calories, tuberculosis had seriously increased, and this time the effects of food shortage in promoting death and disease were infinitely worse. The greatest danger now was from disease: "Belgium is a hospital, the people not dying, as in Greece, in the streets, but in their beds." Infant mortality had trebled, 80% of school-children were stunted, and the incidence of tuberculosis was variously estimated at 3–8 times what it was before the war. Pregnant mothers received last month a very little milk, but no-one else above 6 years old had any. Doctors all clamoured for vitamins, but above all for milk. The decision that medicines, but not food, could pass the blockade was inadequate, for no medicines would help children dying of starvation. The Belgian Prime Minister had applied on March 9 for navicerts: the food was available, the ships were waiting, and the guarantee by the Germans could be relied on, since they had not touched the sealed wagons from Portugal. "Two thousand tons of powdered milk could not prolong the war," but the disintegration of the Belgian nation might. "We ask them to resist and to sabotage. But there are limits to endurance." If this appeal was ignored the effects on future relations would be disastrous.

Colonel DE CAILLY, deputy director of medical services, Free French Army, said that in France milk was now very scarce, fats were deficient, and scurvy was common. What was urgently needed was milk, oils, cereals and food of all sorts.

Mrs. LOTHIAN SMALL, of the Save the Children International Union, divided the occupied countries into three groups:

(1) Those incorporated into Germany (e.g., *Czechoslovakia*). —The ration is the same as for the Germans: there is no variety, but the health of children is not apparently damaged.

(2) *Denmark, Holland, and Norway* (nations closely related to the Germans).—These countries had the highest standard of food before the war, and reserves of food and clothes have enabled them to carry on for some time. Hoping for collaboration, the Germans have given them rather privileged treatment. Rations are high—in some cases even higher than in England—but prices are such that often they cannot be bought. Reserves are now exhausted, especially in Norway. Holland has about half the food it had before the war. The Dutch are not actually starving, but vitality is low and unless there is improvement soon children will go hungry.

(3) *Poland, Yugoslavia, and occupied Russia* (the slave nations).—Here people are moved about like cattle, regardless of the splitting of homes. The anxiety of parents is having bad effects on children. Rations are far lower than in Germany—e.g., ½ oz. of fat per week, and skim-milk given only on a medical prescription. Ruthless requisitions have meant starvation; there is no soap, and the risk from epidemics such as typhus is grave.

Prof. JAMES YOUNG (director of the obstetrical unit, British Postgraduate Medical School) described the blockade situation as immeasurably worse than in the last war, when Holland and Norway, and much of the Mediterranean, were excluded. Hunger œdema, which appeared in Belgium at the end of the second year of the last war, was now rampant. In its totality the picture was tragic: 30% of Belgian children were losing weight, which meant (unless checked) that they would die. As long ago as 1941 about a quarter of the children attending Brussels clinics died before the age of 4. Neither mothers nor children could withstand disease: in the hospitals of Brussels, Ghent and Liége premature births had risen threefold, and there was now a saying among Belgian women: "To have one child is dangerous; to have a second is suicidal." In Greece the famine conditions were worse than any since the Dark Ages. Children, being unable to make the metabolic adjustment often possible for adults, suffered first and most severely, and in Greece last winter 9 out of 10 died before their first birthday.

Miss M. L. HARWOOD, of the Women's Group on Public Welfare, said that the voluntary organisations wanted to show their readiness to support Government action for the feeding of occupied countries—even if this meant continuing difficulties of rationing for some time. "Those who have the good fortune to breathe the pure air of freedom" (as a manifesto from Greek women lately described us) should not stand aside now.

Miss EDITH PYE, of the Famine Relief Committee, thought that the need was to find a way to help, not at the end of the war but *now*. She recalled that in 1924 all the nations in Geneva signed the Children's Charter, the first clause of which is "the child that is hungry must be fed." Our blockade was partly responsible for the hunger of the children of Europe, and if action was not taken these children would be so weakened as to be unable to shoulder the future.

A RESOLUTION

After further discussion the following resolution was unanimously passed:

That this conference, representing over 120 organisations, having heard the facts about conditions in enemy-occupied countries, urges HM Government to grant immediate facilities, not inimical to the war effort, for the transport of food to the children.

The conference was organised by the National Council for Maternity and Child Welfare in coöperation with the Women's Group on Public Welfare.

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A NEW ASSOCIATION OF PHYSICAL MEDICINE

PRESIDING at a meeting in London on May 5, met to discuss the formation of a new British Association of Physical Medicine, Lord HORDER said that the objectives of such an association would be: the achievement and maintenance of physical fitness; the selection on physical grounds, the physical training, and the reinstatement after injury, of personnel in industry and the Forces, and of children in schools; and the diagnosis and medical correction of the diseases of the motor system, notably rheumatism. Personal invitations to the meeting, he said, had been sent out to 58 people and a general invitation had appeared in the medical press. Of those written to, 54 had been in favour of the founding of the association; of the 4 who did not wish to become members only one had thought the association would be a mistake. If formed, the new body would have no political intentions. He moved that the association should be formed.

Dr. C. B. HEALD proposed as an amendment that the name should be the British Medico-Physical Association, and mentioned the analogy of the Medico-Legal Society, which admits members of the bar as well as doctors. He felt that the new association should not limit its membership to medical practitioners of physical medicine but should be at liberty to admit non-medical scientists, especially physicists. This amendment was withdrawn, since the meeting felt fairly clearly that the association should be medical, having prestige within the profession. Lord HORDER pointed out that it would help to integrate the work of those who spend their time chiefly on encouraging physical fitness and those who are chiefly concerned in physiotherapy. Mr. R. WATSON-JONES asked that the orthopædic surgeons should be represented, and judging by their applause, the meeting warmly agreed. The motion "that the British Association of Physical Medicine is hereby constituted" was then unanimously carried.

Having achieved this creative act the meeting seemed in doubt about the nature of their progeny. Were they all ipso facto founder members? They decided they were not. Who then were the founder members? Lord HORDER suggested that they should be an elected council of 20; and that at the next meeting this nucleus should propose methods of admission to the association, which could then be discussed. After electing the inquiry committee of 10 to the council in a body, the meeting decided to pick others from nominees of the physical-medicine section of the Royal Society of Medicine, and of the physical-medicine group and the spa practitioners group of the British Medical Association, these nominations to be sought by post.

Names should be sent to Sir Frank Fox, 106, Finchley Road, NW 3, before May 20. The names will be submitted to a ballot at a meeting to be held at 11, Chandos Street, W1, at 2.30 PM on Tuesday, May 25.

MEDICINE AND THE LAW

Disclaimer by Impersonated Practitioner

LAST November a general court martial was held on a West African described as Lieut. Eustace Edward Alar Akwei, a name to which—as will be seen—his claims were doubtful. He pleaded guilty to two charges, one of having falsely stated in a certificate in his record of service that he was a Bachelor of Arts, Medicine and Surgery of Edinburgh University, the other of having infringed Defence Regulation 20 by using a name other than that by which he was known before the war. On a third charge of claiming to possess the medical degrees with intent to defraud no evidence was offered. He was sentenced to be cashiered; this punishment was commuted (by the army commander before whom it came for confirmation) to a sentence of dismissal from the service. While the accused had obviously committed an offence and had been previously convicted, there was some remarkable testimony to his good character and valuable work as a member of HM forces. For the latter reason among others no mention of the case was made in these columns at the time. Now, however, it is necessary to refer to it in view of a disclaimer which has reached us from Dr. Eustace Akwei, of Accra in West Africa. His letter explains that he himself came from the Gold Coast to Edinburgh University in 1935 and took his medical degree there in 1940, registering it with the General Medical Council in July of that year. A newspaper account of the November court martial has been brought to his notice in West Africa. He is naturally anxious that publicity should be given to the usurpation of his identity. The qualifications which the court-martialled officer falsely stated himself to possess were qualifications actually earned by Dr. Eustace Akwei now practising in Accra. The latter complains also that a medical publisher in England has sent him a bill for a debt presumably incurred by the man who was court-martialled last November. This is not the first time that a registered medical practitioner residing abroad has been the victim of an impersonation and a consequent annoyance for which there is no adequate remedy.

The facts stated by the prosecuting officer last November were these. The accused had carried out medical duties with various units and at the Cambridge Hospital. To an officer of the Special Investigation Branch who interviewed him in October he described his arrival in England in 1935 as a stowaway in a steamship. He studied medicine, he said, at Manchester but was sent to prison in 1937 for false pretences. This set-back and his want of money interrupted his medical training; going to London, he was sentenced to six months' hard labour for false pretences. On his release he tried to get back to his medical studies. He attended a public health course for three months and obtained hospital appointments at Croydon, Northamptom and Bristol. While he was at Northampton, he stated, the British Medical Association raised the question of his registration and fees; he thereupon decided to practise as Dr. Akwei from the Gold Coast. He was convicted at Bristol in July for forgery (in connexion with documents purporting to be testimonials from doctors) and was discharged on probation. He admitted that, when he reported for military service, he kept up the pretence of being a properly qualified doctor from West Africa; he knew he was not entitled to the letters which represented degrees, but he persuaded himself that he could use the name of Akwei since it was that of his grandfather. He pleaded that, having held various posts at hospitals, he felt himself able to look after troops although technically not qualified. He wanted to remain in the Army and had volunteered for air-borne service.

In spite of the unsatisfactory elements in the career of the accused, a colonel of the RAMC gave a good report of him during the court-martial proceedings. At a junior officers' course he had come out second from the top in the written examination, nearly obtaining the "distinguished" mark; his conduct during the course was exemplary. Asked by the president of the court about the nature of the course, the witness said its object was mainly to teach army methods to newly-joined officers; medical questions were asked at the examination and the accused answered them satisfactorily. The commanding officer of an OCTU testified that, when attached to his unit, the accused did his duties admirably and was a well-conducted member of the officers' mess. A testimonial from a Harley-street practitioner was also put in: it stated that he had been assisted by the accused in work at two hospitals and had formed the impression that he had a sound knowledge of medicine. The defending officer at the court martial contended, not without plausibility, that the accused had been over-ambitious but had carried out his responsibilities in the RAMC conscientiously and with considerable skill. His pursuit of a medical career brought him into a position where he had either to claim qualifications which he did not possess or to disclose the unfavourable episodes in his past. If his record arouses a certain sympathy because in his military service he did apparently more good than harm, we must not forget to sympathise with the duly qualified practitioner whose name and degrees he adopted.

MUETZEL reports good results in the local treatment of 182 indolent wounds with a dusting powder 'Sufortan,' a combination of sulphapyridine with urea and formaldehyde (*Med. Welt*, 1943, **12**, 255).

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In England Now

A Running Commentary by Peripatetic Correspondents

THE subject was a school report, and not a good one. It's awful the way these boys copy the politicians: "Come, no recriminations," said Bunny; "tell us a yarn and not too much ersatz in it." We were lying by the river, this and the buzz-hum of flies and the barred subject like intersecting lines fixed my tale's position in time at 20 years ago and in space on the equator, at Guayaquil, sweltering like hell with Chimborazo's snowy cap visible, yet as incredibly remote as Heaven. I was on a small coast ship, and when we got to this hole up 40 miles of pestilential river the officials told us that no-one was allowed to land because there was yellow fever ashore. We lay there for three weeks, over the Christmas holidays, unloading and loading cargo from tardy lighters. It wasn't so bad for me because I'd got the gulls, pelicans, waders, alligators (not crocodiles, my boy) and some amazing insects including locusts which ate our white uniforms, to amuse me. The rest of the crew in this dank heat got very bored, and on Christmas day when we were having dinner it was announced that some of the firemen who had got ashore earlier by boat were being chased by the cops and were swimming back. One of them, a red-haired trimmer called Patrick O'Flaherty, was so under the influence that he forgot he couldn't swim and was drowned. I spent Christmas afternoon with the mate, dragging for the body; it came up three days later from under some barges. Permission was given for a dozen to attend the funeral; we looked like a scratch cricket-team—Liverpool bowler hats, ready-mades from the Minories, and white uniforms. When we had climbed up to the cemetery—they bury you in a hole in a wall there, like the pigeon-holes in desks, which they seal up; so many sucrés a month, or out you go into the common grave, my lad—there was no-one there. The agent bustled off and after a while returned with some Ecuadorians. The remains of poor O'Flaherty were in a small mortuary and when the door was opened a vast cloud of flies zoomed out—not like our bluebottles but with lovely burnished brass bodies and a less tranquil hum. The procession formed up, the Ecuadorians sweating and stumbling under their load, then where the chief mourners should have been came a noisy fog of flies, followed at a very respectful distance by the team. When we got to the pigeon-hole which the shipping company had hired for poor O'Flaherty (only for 3 months, I believe) there was no priest. The staff work was deplorable. Clearly circumstances did not invite lingering; something had to be done quickly. An ancient association between Church and Medicine, I suppose, made them turn to me. I had never been to a funeral; all I knew was that bit about dust to dust and ashes to ashes (and I might have added O'Flaherty to flies). Thank heavens, I did know my Æneid—at least the first 50 lines of book 1—*Arma virumque cano, Troiæ qui primus ab oris*, splendid stuff, my boy. In the middle of line 26, after "*exciderant animo*" I put in the bit about our dear departed brother Patrick O'Flaherty, the dust and ashes, and a few very heartfelt prayers in English, then on with the Latin. Very useful the classics, they add considerable tone.

"But how is it you knew just fifty lines," asked the boy suspiciously?

"Well, as a matter of fact—er—I learnt it originally—as—er—sort of imposition. But no recriminations!"

* * *

Despite the shortage of doctors, the Admiralty have not so far adopted the 1914–18 expedient of employing medical students as surgeon probationers, and those of us who were then one-stripers RNVR cannot entirely avoid the uneasy feeling that our shortcomings may have led My Lords to believe that we were more trouble than we were worth. Admittedly some of us had not progressed far in the clinical part of our medical studies, and the more junior we were the greater was the thrill which we derived from being addressed by our fellow-officers as "Doc." They knew, of course, that we were not really doctors, but this knowledge was not always shared by the lower deck; and one surgeon probationer of unusually mature and dignified appearance was believed by the ratings in his destroyer to be a distinguished Harley Street specialist. I was fortunate in not being left on my own in a small ship; I served under a two-striper, and I well remember one of the first tasks he allotted to me. It was to make up a prescription for a stock bottle of cough-mixture containing ammonium carbonate, which was meant to be suspended in mucilage of acacia. I had not done any practical pharmacy, but my arithmetic was excellent and I entered with confidence on the task of calculating how much of each ingredient was required for making up a Winchester quart. I knew nothing of the use of a pestle and mortar, but my textbook told me how much acacia powder should be used and accordingly that amount, with the other ingredients, was emptied into the large bottle. This was then vigorously shaken, but all the shaking in the world could do nothing to prevent the acacia from floating on the top. In due course a patient arrived for his dose of medicine and half an ounce was poured out—but naturally this contained no acacia. I felt it was rather unfair that he should not have a little of everything to which he was entitled, so with a teaspoon I managed to extract from the stock bottle one of the floating lumps, which was then added to the dose in the medicine glass. Perhaps the one dose cured him; at any rate he did not return for more. But on the strength of this one case I hesitate to suggest that acacia will cure bronchitis if administered in large lumps.

* * *

One of the pleasures of my walks abroad is the brass plate of two of our unregistered confreres. Altering the names, it reads:

A. B. SMITH
B. C. SMITH
Osteopath and Psychopath

* * *

I found that dreadful time between tea and supper even more trying than usual today. At 5 PM I was sitting in front of the common-room fire alone. There was no-one to talk to. Everyone else seemed to have work to do but I had none. The result of it all was complete boredom. Fifteen minutes ago I had turned on the wireless in search of amusement but could find only a propaganda broadcast in an unfamiliar language and somebody's hot jazz-band grinding out music which seemed to be a combination of rhythmic sound-patterns indifferently executed on muffled drums and chromatic scales rendered with variable accuracy on a seasick saxophone. In a despairing effort to find something to take my mind from my misery I had attempted to tune in to Hamburg in the hope that Lord Haw-haw might stimulate a little healthy hate; but I could find nothing but a cats' concert of unearthly wails on that wavelength. In disgust I subsided into an armchair by the fireside and absently began to stir up the coal in the grate. Suddenly I bethought me of Freddy Grisewood and in a fit of remorse of conscience I laid aside the dreadful instrument of fuel wastage. For five solid minutes I sat and gazed with hostile eye at the inoffending fire and then with the idea that it was my duty to follow the war news more carefully than I had been doing of late I looked around for my favourite newspaper, only to find that one of my acquisitive colleagues had removed it to his room. The only paper which was left was trash of the worst kind. I went over to the magazine table in search of the *Lancet* but it had gone too. Only one journal, and that on an abstruse and specialised subject, remained. I turned its pages but thirty seconds' browsing convinced me that if I were to make sense of what I was reading I would require two years special study. I thought I might go for a walk but a glance out of the window reminded me that it was still raining. I went over to the piano but could not find my own music; in its place were a couple of pieces of hot jazz and a futuristic study in F sharp minor by a modern French composer. I tried to play some things from memory but could not recollect the correct harmonies and I gave up in despair. As I rose from the piano the mess bore came in. I went out for a walk after all; for rain and one's own company, even when depressed, are preferable to his platitudes, his pointless anecdotes and half-baked theories.

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Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M P

THE improvement in the war situation has opened up new problems on the Home front. In 1940 discussion of a housing policy of any comprehensive kind in the House of Commons would have been premature; in 1943 it is urgent. And this sense of urgency permeated the debate in the House last week and had its reflection in the House of Lords, where a debate on the health of the people was introduced by Lord Geddes. Lord Geddes took as his text the recent publication *Our Towns—a Close Up*, a report on conditions among women and children evacuated during the blitz (see p. 631). These conditions arose from the slums in which they lived, and Lord Geddes wanted a policy of positive health to prevent them. This goes, of course, far beyond housing. It includes the bringing together of an immense volume of knowledge, by a "general staff of health," over perhaps fifty years, of everything affecting health. The physical building of houses to which the House of Commons turned their attention is the basis of the application of this knowledge, but the debate cannot be regarded as reassuring. The problem is clearly visualised—overcrowding in the cities, overcrowding in cottages in the country, and the urgent need of more houses in town and country alike.

Under war conditions there is a shortage of materials—wood for instance—and in the 3000 rural cottages which are to be built, stairways and bedroom floors will be of concrete and cement in many places. There is also a shortage of materials and of labour for repairs. Lord Winterton, who opened the debate in the traditional parliamentary way by moving a reduction of the Health vote by £5, thought that the Minister should open a crusade, like those for saving food or for War Savings, to produce the extra bit of energy needed to get a move on in housing. During the war there has not only been no slum clearance, but houses scheduled for demolition have been taken back into use. And the plans for planning have up to the present added to those who must be consulted before any housing can be undertaken without producing a plan of housing. The provision of 3000 rural cottages is more of a patchwork than a plan.

Mr. Quintin Hogg said that we only came to realise the housing question as the ugly thing it is "when the population of the cities overflowed into the evacuation areas" at the beginning of the war. The medical profession at least recognised the problem before this, as the reports of medical officers of health, school medical officers and others bear witness. But no-one did enough about it. Mr. Hogg spoke scathingly of the monuments of our civilisation—our gasworks and railways, the backwaters of canals, acres of back-to-back houses with insufficient sanitation, the poor quality of our domestic architecture. All these things were known; what is new is that many men and women of all parties are now being convinced that these things must be changed.

Sir Geoffrey Shakespeare spoke of the 3 million houses which have suffered war damage, of the million which have not been built because of the war. We should need an annual output of at least 300,000 to 400,000 houses. All this will keep the building industry busy for twenty years. But who is to direct the work, for there is chaos and division of responsibility among six departments? And if we are to build houses to meet demands, what policy of the location of industry is to be pursued? Without an effective policy greater London will continue to spread into an ever-diminishing countryside in the Home Counties.

All the Minister could say in answer to the debate was that the Ministry of Health is alive to the need of surveying the ground fully before the end of the war and tackling the major detailed problems. The Minister also dealt with special points, such as the amount of money allowed for repair of houses, which is now increased from £100 to £200.

We got patches for some present abrasions and we got an optimistic prognosis for our more distant future condition, but we got no hope as yet of a "positive health" policy in housing.

FROM THE PRESS GALLERY

Housing Policy after the War

IN the debate in the Commons on May 4 members of all parties emphasised the seriousness of the housing problem and the need to make comprehensive plans now so that an immediate drive may be started as soon as labour and materials are once more available. Mr. ERNEST BROWN, minister of health, in his reply said that while the ban on new buildings lasted the policy of the Government was to make the best of the accommodation available. He refuted suggestions of complacency and said that the Central Housing Advisory Committee had been regularly active on the problems that really mattered. Subcommittees were making reports on the issues that would have to be faced. Rural housing was not being neglected. The aim would be to supply a simple and practical house for country-dwellers which would be a comfortable, healthy and happy home for parents and children. Shortage of timber might make it necessary to use concrete for floors and stairs. It was part of his duty as Minister of Health to see that the Minister of Planning was consulted. He thought that the problem of obsolescent houses would be more subtle and difficult than that of slum clearance. But he could assure the House that his ministry was fully alive to the need of surveying the ground before the end of the war and tackling the major details. They were working in the closest harmony over this great field with the other departments concerned. The War Cabinet had now authorised a move for the further repair of unfit houses to make them reasonably habitable. An expenditure of £200 per house would now be allowed—double the old figure. At the moment they were working on 40,000 houses in what had been called the "red spots." There were 24 towns where the pressure on accommodation was the hardest, and labour and material had been made available in those places. The Ministry had requisitioned 51,000 houses for dwelling purposes, and for other purposes, such as residential nurseries for children, another 13,000 houses. Furthermore orders had been issued under emergency powers closing various towns, so that no-one could go into them except those who were authorised under an Essential Work Order as being industrial workers who were necessary for the production of war materials, or for certain other essential reasons. The provisions of the Rent Restrictions Acts had been enforced with great pertinacity and efforts were being made to make it known to the public all over the country that "key money" was illegal and to induce people to come forward with evidence which would enable local authorities to take action against offenders. In conclusion Mr. Brown said that the moment it became possible in his judgment to have new housing construction, and labour and materials were available, the happiest man in the country would be the Minister of Health.

The Health of the People

Lord GEDDES in opening a debate in the House of Lords, on May 5, on the national health said that he had been familiar with slum conditions in this and other countries for fifty years, and was not so surprised as others had been at the condition of the children evacuated from the cities at the time of the blitz. Indeed, when he saw the trains unloading the evacuees he got the impression that they showed an enormous improvement in physique and in health. Practically no sign of rickets was visible, and many of the diseases which used to be obvious in the slums were not present to any extent among the children. But there was a strange listlessness about the children, women and conscripts, and much of the independence which had characterised the dwellers in the densely crowded parts of the cities when Lord Geddes was a medical student and a young doctor in the slums seemed to have vanished. The mothers did not know how to cook, and one little boy told him that he had never seen a meal cooked in his own home. Lord Geddes felt that these people were "cultural orphans." Their physical condition was better than their mental state, and this shocked him more than that some of them were infected with lice and scabies. The conditions of 1939 showed our failure, not only in such material things as housing, but failure to pass on the cultural tradition of the country to our young

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people. He had been greatly cheered on a recent visit to his home village to find what a transformation four years' life in the country had made in these people. They had been magicked by the country and many were now the backbone of village life. Lord Geddes also deplored the surprising extent to which the evacuees were convinced they were not well. The adults and older children seemed to believe that patent medicine was an essential article of diet. They had been infected, he declared, by the medical profession with the cult of negative rather than positive health. The whole tendency of the medical profession—and it must be so under present conditions and he thought it would be worse with a state medical service—was to give people tablets or fluid out of a bottle. The term positive health, used in the BMA and Beveridge reports and accepted by the Government, but first introduced by Alexis Carrel, meant that people should be well without medication, that they should resist disease. There was at present no organisation on a large scale dealing with positive health, "though a certain amount was done by a certain section of the medical profession." But there was no science of positive health. We did not know whether a child was benefited by being given large quantities of milk between eleven and thirteen years; it grew larger, but there was a great deal of evidence to suggest that that increase of growth was not good. Men of the larger size and bulk were dying younger; the death-rate was rising in the 50–65 period, and that showed that something was wrong somewhere. There was real truth in spiritual healing and that will made for health. Science was laying undue emphasis on the side of the attackers, and too little on the side of the defence of the human body. Alexis Carrel, some ten or fifteen years ago, had suggested that there should be in each of the great countries a "general staff of health," chosen from men of the synthesising type of mind, to watch over the research that was being done, collect the results and advise the government on social legislation affecting health. Such a general staff of health in fifty years, or perhaps a century, might discover what positive health meant.

Lord LATHAM thought that if the nutrition of the people was not to suffer, communal feeding must remain a permanent feature of our postwar life, at least until housing conditions improved. He urged the Government to hasten with their housing proposals, for if peace should come before the plans for dealing with overcrowding were ready it would not matter much what had happened about education, or a comprehensive health service. Lord LANG of LAMBETH said that two things were urgent—better housing and training for our girls in the functions and responsibilities of motherhood. There was no more essential industry than keeping a home, and Lord Lang held that we should draw away the minds of the mothers from the idea that everything was to be done for them by nursery schools, by medical inspection in the schools, and so on, and awaken their sense of responsibility. The ARCHBISHOP of YORK said that any medical service would fail unless the environment of the people was also dealt with. Many children when they reached school age had already acquired habits almost impossible to eradicate and he made a strong plea for the establishment of a large number of nursery schools.

Lord SNELL, replying for the Government, said that although there were complaints about the evacuees they referred only to a small number. There was nothing really wrong with our young people and conditions had considerably improved since 1939. This was to be attributed to the natural influence of the country, but also to the development of welfare services, such as children's hostels, hospitals for difficult children, medical services, the provision of clothing, and social and occupational services for mothers. He admitted there might have been a wrong emphasis in our educational system which in the future might have to train children and mothers in the really responsible things. The medical and social services in this country would stand comparison with any in the world. Comparing the first year of the last war with the first year of the present war, showed satisfactory results. The tuberculosis death-rate in England and Wales in 1914 was 1361 per million living persons; in 1939 it had been reduced to 636. The death-rate among children under one year in 1914 was 105 for every 1000 children born; by 1939 it had fallen to 50. There had been an increase in the average weight of school-children. The expectation of life had been lengthened, and there had been a disappearance of the incidence of smallpox and a reduced incidence of venereal disease, even allowing for war-time increases. During the war itself remedial measures had not stood still. The birth-rate in 1942 was the highest since 1931. The death-rate was 11·6 per 1000, the same as in 1938, which was the lowest since 1930. There had been a new attack on tuberculosis; in the campaign against diphtheria 4 million children under 15 had been immunised; 1100 war-time nurseries had been opened, and 475 had been approved or prepared. Nevertheless certain defects remained. The services tended to be piecemeal and to be restricted in scope. Medical care extended only to insured persons and not to their families. The administration was divided among a number of authorities and coördination was faulty. The administrative divisions had a disintegrating effect on the health services and the general practitioner found himself more or less divorced from the specialist local-government services, just as those services were divorced from one another. The hospital services had developed in an unrelated and therefore inadequate manner. A period of reorganisation and reform was essential. The Minister of Health's postwar policy, announced in October, 1941, embodied the principle of laying upon local authorities a statutory responsibility for comprehensive hospital services by planning on the basis of wide areas and of division of function between hospitals. The postwar policy must include the position of the general practitioner. When our young doctors returned from the war they must be given an honoured and useful place in their profession. Lord Snell said that he did not propose to relate this discussion to the Beveridge report, except to say that any scheme of social security required a comprehensive health service and the Government had accepted the principle of a national health service. They had also accepted the principle that this must be based on the well-tried local government machine, and that the wellbeing of the medical profession should be safeguarded. The Minister of Health and the Secretary of State for Scotland had discussed these proposals with their medical advisory committees, which had begun preliminary discussions with representatives of the medical profession, local authorities and voluntary hospitals. All these had set up committees, which were meeting the officers of the ministry for detailed discussion, and it was hoped that in the next few months a general statement of Government proposals would be published. We had reached the end of a period of sowing and of growth and we were at the beginning of the reaping of a very fruitful harvest. The Government would do their best to grasp the opportunity for a social change of great importance, as it was believed would also the medical profession and the voluntary hospitals. The aim of all must be to establish a foundation on which a healthier and happier Britain might be built.

Nurses (Scotland) Bill

In the House of Commons on May 6, the SECRETARY of STATE for SCOTLAND presented this bill, which makes provision in Scotland for the enrolment of assistant nurses for the sick, for the restriction of the use of the name or title of nurse, and for the regulation of agencies for the supply of nurses for the sick and to amend the Nurses' Registration (Scotland) Act, 1919.

QUESTION TIME

Food Conference in USA

Replying to a question the SECRETARY OF STATE FOR FOREIGN AFFAIRS said that the primary object of the forthcoming food conference at Hot Springs is to give the United Nations an opportunity to exchange information and views on longer term problems concerning the production and consumption of foodstuffs and other essential agricultural products. The conference will devote particular attention to the production and imports of the various countries, with an eye to the general improvement of levels of consumption, and the extent to which productive resources can be made to match the needs of consumption. The conference will no

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doubt also consider what international arrangements would be required to improve the efficiency of production and distribution, with due regard to the interests of both producers and consumers. Relief is not included within the scope of the conference.

Ex-Servicemen and Neurosis

Captain J. A. L. DUNCAN asked the Prime Minister if he would make a statement on the development of the scheme by which personnel discharged from the Services on grounds of neurosis or temporary instability could receive appropriate rehabilitative treatment; whether any residential centres had been established; and which Government department would be responsible for its working.—Mr. WINSTON CHURCHILL replied: All cases of personnel who are being discharged from the Services on the grounds stated in the question are considered by the Ministry of Pensions and, where appropriate, medical treatment, including rehabilitation treatment, is provided for them either at Ministry of Pensions hospitals or at neurosis centres under the Emergency Hospital Scheme. These centres, eleven in number in England and Wales, and two in Scotland, are residential and are under the supervision of the Ministry of Health and the Department of Health for Scotland. For those not requiring, or no longer requiring, inpatient treatment, outpatient facilities and social help are available at clinics and through other mental health agencies conducted by local authorities or voluntary bodies. These latter services are not at present complete or fully coördinated, but are being developed under the auspices of the Board of Control as far as war conditions allow.

Medical and Health Services

Sir PERCY HURD asked the Minister of Health whether steps would be taken as far as practicable to enable medical men, women and nurses serving with the fighting Forces abroad to express their views in the discussions now proceeding on the future of medical and health services, especially seeing that these discussions went beyond anything contemplated before the war, and that the success of any new type of services would be impossible without their coöperation.—Mr. E. BROWN replied: I contemplate publishing as soon as practicable a statement of the general nature of the Government's proposals, which will enable everybody (including men and women in the Forces) to see for themselves what is suggested and to discuss and, if necessary, criticise them before the stage of legislation is reached.—Sir P. HURD: Would it be practicable for the Minister to get this detailed information into the hands of doctors and nurses overseas who would be affected?—Mr. BROWN: I think that in this matter there should not be undue difficulty. The several professions have very clear and regulated channels of communication.

Factory Medical Officers

Mr. E. L. GRANVILLE asked the Minister if he would consider the incorporation of full-time factory medical officers in any scheme of postwar medical services.—Mr. BROWN replied: The position of the various existing medical services, in relation to any scheme for a more comprehensive health service after the war, will need to be considered and discussed with those concerned. I am not yet in a position to make any detailed statement on the subject.

Rehabilitation Treatment for Artisans

Mr GRANVILLE asked the Minister if he would consider the immediate provision of rehabilitation centres for sick and injured artisans analogous to those provided for the Services, to be worked by, or in conjunction with, factory medical officers.—Mr. BROWN replied: Rehabilitation treatment is already being provided at or in connexion with a number of hospitals under the Emergency Hospital Scheme, and medical officers of my department are at present visiting all the larger hospitals in each region to discuss with the hospital authority methods of developing such provision for their sick and injured patients, whether or not they are included in the EHS, to the greatest extent that war conditions will allow. Coöperation between the hospital and the factory medical officers concerned is an important element in the rehabilitation measures envisaged. I understand that the Minister of Labour and National Service has decided to set up an experimental centre to provide for certain types of cases needing rehabilitation beyond the stage up to which it can reasonably be provided as part of the hospital services and that he has under consideration the question of extending the experiment in accordance with the recommendation of the Tomlinson Committee.

Non-pulmonary Tuberculosis and Milk

Mr. DAVID ADAMS asked the Minister whether, in intensifying the offensive against pulmonary tuberculosis by mass radiography and appropriate treatment, together with certain financial allowances, he intended to extend these remedial measures to sufferers from non-pulmonary tuberculosis and other diseases acquired by consumers of infected milk supplied under the authority of the Ministry of Food, and which milk could not be rejected by medical officers of health.—Mr. BROWN replied: No. There is a difference between pulmonary and non-pulmonary tuberculosis, in that the former is probably unique among common disease in combining great importance of early treatment with danger to the community if the disease is allowed to develop. The second factor is not present in non-pulmonary tuberculosis.—Mr. ADAMS: Does not the Minister agree that scientific opinion is clearly in favour of early remedial measures with regard to non-pulmonary tuberculosis?—Mr. BROWN: Our resources in this matter are limited and it is my judgment that it is more important to deal with pulmonary than with non-pulmonary tuberculosis at this stage.

Milk for our Cities

Mr. W. MABANE, the Parliamentary Secretary to the Ministry of Food, replying to a question, said that the time London milk is kept from production to distribution to the consumer varies in general from a few hours to 48 hours according to the distance the milk has to travel.

Mr. JOSEPH HENDERSON asked if he was aware of the disquiet in Manchester at the poor quality of milk supplied to the inhabitants and the fact that last summer thousands of gallons of milk were unfit for pasteurisation on account of souring, and that 75% of the milk supplied to school-children was unsatisfactory; and if he would take requisite steps to see that an adequate supply of Grade A milk was supplied to Manchester.—Mr. W. MABANE replied: While precise complaints of the character suggested in the second and third parts of the question have not been brought to my notice, representations have been made to my department about the quality of milk supplied in the Manchester district and are receiving consideration.

Mr. HENDERSON: Is not the Minister aware that this matter is gravely disturbing the mind of the local medical officer of health? Is he further aware that several wholesale milk distributors would gladly refuse acceptance of this impure and unclean milk but are compelled to take it on the advice of the Ministry of Food, and are compelled to mix this low-grade milk with high-grade milk? Is not that a contamination that could be avoided?—Mr. MABANE: I am aware of the concern of the local authority in this matter. Certain adjustments are to be made in the areas in which the Manchester milk is collected, and I hope that they will cause considerable improvement.

Doctors Repatriated from Italy

Sir ALFRED KNOX asked the Secretary of State for War whether all the prisoners of war now being repatriated to and from Italy were disabled or seriously ill.—Sir JAMES GRIGG replied: No, sir. More than half of those repatriated are doctors, medical orderlies, drivers of ambulances and chaplains. These are entitled to be repatriated under International Conventions, but a sufficient number has been retained at the camps to care for the needs of the prisoners.

Infectious Disease in England and Wales

WEEK ENDED MAY 1

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1683; whooping-cough, 1640; diphtheria, 667; paratyphoid, 2; typhoid, 16; measles (excluding rubella), 13,104; pneumonia (primary or influenzal), 906; puerperal pyrexia, 137; cerebrospinal fever, 86; poliomyelitis, 1; polio-encephalitis, 3; encephalitis lethargica, 3; dysentery, 135; ophthalmia neonatorum, 72. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on April 28 was 2231. During the previous week the following cases were admitted: scarlet fever, 142; diphtheria, 41; measles, 187; whooping-cough, 30.

Deaths.—In 126 great towns there were 2 (1) deaths from enteric fevers, 3 (0) from scarlet fever, 16 (3) from measles, 15 (0) from whooping-cough, 13 (2) from diphtheria, 72 (14) from diarrhœa and enteritis under two

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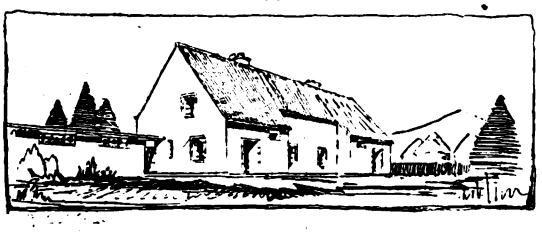
Public Health

TOWN PLANNING AND PUBLIC HEALTH

In a Chadwick lecture given on April 6 at the Royal Sanitary Institute, Mr. THOMAS SHARP said that the intention of the Planning Acts in operation before the war (and still in operation, though we may hope for stronger powers after the war) was to secure "proper sanitary conditions, amenity and convenience." In the broadest sense, all town and country planning should be directed towards the establishment of a high standard of public health; and public health, he felt, should be conceived as both physical and social health. He thought it a grave fault of town planning so far that—as a result of the separation of housing from the broader planning—physical and social health have been considered separately. In "solving" the housing problem

A



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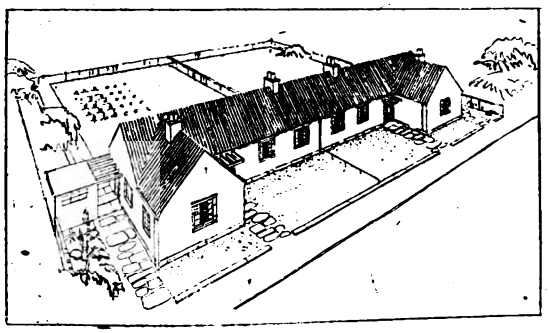

Perspective of model plans, prepared by the Department of Health and approved by the Scottish Housing Advisory Committee, of rural houses to be built in county areas in Scotland this year. (A) two stories, with one living room and four bedrooms; (B) single storey, with one living room and three bedrooms.

by developing housing estates in places which involve their inhabitants in excessive daily travel to and from work we have not achieved any real solution at all; and, as McGonigle's survey of Stockton-on-Tees suggested, though the new houses are demonstrably healthier than the slums they were built to replace the standard of health of the people living in them does not necessarily correspond.

In the wider sense of public health, town planning can secure a proper relationship of the various parts of the town or village to each other. Work-places, schools, shops and various kinds of social, cultural and entertainment centres, open spaces, and the countryside itself where possible, should all be easily accessible from the homes of the people. In the narrower sense, town planning for public health will be principally concerned with the provision of sufficient space about buildings to secure desirable standards of ventilation and lighting. In the past thirty years or so town planning has expressed the measure of space about houses in terms of so many houses per acre. This in some ways has proved to be unsound. The numbers of houses per acre laid down were never arrived at scientifically: they were measures of space for garden cultivation rather than for ventilation and natural lighting. From the point of view of public health the proper measure is one of space between buildings. The space required for ventilation will generally be less than that required for natural lighting, so that lighting must be the determining factor. Sheer daylight or skyline is the fundamental requirement, since it is impossible to get more than a fraction of the total available sunshine into a room unless it has windows in all quarters from which the sun shines—a condition only obtainable in a glass box on a hilltop. But a pretty full measure of daylight can be assured. The living room of a house should have a view of at least part of the sky opposite the windows at an angle of 18–20° above the horizon. In planning for sunlight the conflicting demands of various members of a household have to be considered. Sunlight penetration into living rooms should be planned for the time when they are most likely to be used—the evenings when the family are most likely to be at home. Thus these rooms should be orientated somewhere towards the west. The kitchen on the other hand is likely to be most used in the morning, and so should have a touch of east in its orientation. The planning of office quarters has been seriously neglected, particularly in large cities, where the general standards of natural lighting are deplorable because of the great height of buildings in relation to ground space. Under present conditions of land ownership it is extremely difficult—indeed almost impossible—to plan properly for the full requirements of public health.

An Urban Close-up

Evacuation from the towns to the country in the first year of the war not only provided a large-scale social experiment, but lifted the lid off the less exposed corners of our towns. The way of life of the poorest section of the community was suddenly seen by the unsuspecting people of Britain. The shock was severe. For fifty years there had been undoubted progress in improving the economic and hygienic conditions of the population as a whole. Before the war most people had seen the new building estates, the baths, and the reasonably clean and adequately clad families which they presumed represented the poorer classes. Remembering the earlier reports of urban poverty, of crime, disease and drink, all seemed remarkably well.

In fact of course the ordinary person never penetrates the recesses of real slums, and the conditions and habits of life in that insanitary and degrading environment is known as a rule only to the student of social statistics, to social workers who work in them, and the poorest citizens who inhabit them. A remarkable study [1] of our towns just published is therefore an eye-opener. The now well-known accusations against evacuees—their wrong habits, their laziness and their lousiness—are examined both quantitatively and qualitatively, and are related to the economics of slum conditions. The accusations are substantiated but it is the community that stands indicted. Many aspects of urban life are examined; some of the recommendations made are immediately practicable under existing legislation which is still too often permissive; some require new legislation or the amendment of existing statutes; others belong to long-term policy. Every page underlines the urgent need for increased social security to safeguard the community as a whole. The report has a well-documented appendix, and although the text is spiced with figures and tables it retains a human and almost racy style.

Lest it be thought that bad conditions exist only in our towns, a recent advertisement in a genteel journal is of interest. "For sale, freehold, six 3-roomed condemned cottages bringing in £6 18s. per month rent. £600 for quick sale."

Continued from previous page

years, and 23 (0) from influenza. The figures in parentheses are those for London itself.

There were 9 deaths from diarrhœa at Birmingham. Liverpool had 5 fatal cases of whooping-cough.

The number of stillbirths notified during the week was 248 (corresponding to a rate of 33 per thousand total births), including 24 in London.

LONDON DINERS.—Of the 188,623 children who attended elementary schools in London at the end of February, 145,863 were having meals or milk at school, and of the 10,428 who attended secondary schools 5587 had meals or milk. In all dinners were served to 59,168 children, just over 2000 being supplied by school canteens and the rest through the Londoners' Meals Service.

1. Our Towns: A Close-up. A Study Made During 1939–42. (Humphrey Milford, Oxford University Press. Pp. 143. 5s.

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Letters to the Editor

THE SPECIAL CENTRE

SIR,—In planning our postwar medical services a balanced judgment is of paramount importance, not only for the welfare of the community but for the whole cause of medicine—social, preventive and therapeutic—and medical education. Some of your correspondents have urged the need for hospitals given up entirely to the rheumatic diseases, hitherto sadly neglected in this country. An analogy has been drawn between the facilities available for the treatment of pulmonary tuberculosis with its necessary 30,000 beds and the rheumatic diseases with less than 1000 beds. In your issue of May 1, Dr. Osman makes a justifiable plea for improved facilities for the treatment of Bright's disease.

Such well-merited criticisms can be applied equally well to almost every disease of chronicity where the treatment is necessarily long. (The term "chronic disease," with its implication of "old chronics," is to be deprecated, for the whole problem of such disease should be regarded as an acute one, whether the disease in question is rheumatism, chronic lung disease, heart disease, or gastro-intestinal or nervous diseases.) Few, however, would suggest that postwar planning should, in addition to hospitals for the rheumatic diseases, maintain specialised hospitals for all these varied groups. In fact, as General Max Page in the *Lancet* of May 8 writes, rigid specialisation does not make for efficiency and hinders rather than assists accurate early diagnosis, the basis of all treatment. For the older school of general physicians is fast disappearing and we are seeing medicine being so divided and subdivided into isolated compartments that we can no longer get a general perspective of the whole. As an illustration, some months ago I was introduced to a clinician who went a stage further than being a cardiologist, for he told me he specialised in heart-block. I could not resist asking: partial or complete?

No-one will deny the great value of specialisation and its contributions to medicine as a whole, but one must also recognise its risks and take precautions against them. It is true that, in the past, the public has demanded specialisation. One commonly hears of phthisiologists, rheumatologists, gastro-enterologists, endocrinologists, proctologists, and so on, but I would plead for a return to the more balanced days of the general physician with his specialised knowledge in diseases of, for example, the chest or heart, the rheumatic diseases or kidney disease. This seems to me infinitely preferable, since specialisation can hardly be effective without a knowledge of general medicine. In the past we have had sufficient experience of the unfortunate results arising from the divorce of preventive and therapeutic medicine. I can illustrate this from the point of view of the medical student.

Throughout his clinical studies the student has little opportunity for seeing cases of pulmonary tuberculosis. Such cases are not, for the most part, seen in the wards of a general hospital and few opportunities are available for the student—the general practitioner of the future—to learn anything about the medical, social and economic aspects of this widespread disease and its early diagnosis and treatment. Yet in the "tuberculosis dispensaries" and sanatoria there is an abundance of material which, from the point of view of student education, is entirely wasted because these institutions are generally isolated from the teaching hospitals. Again, unless the tuberculosis physician is associated with a general hospital he tends to fall into a groove, seeing everything with a tuberculous eye, for pulmonary tuberculosis may, in one form or another, simulate almost any disease. This is no less true of the rheumatic diseases.

One solution appears to be the recognition as an acute problem in hospital planning of adequate provision for the so-called "chronic sick," whether they are suffering from pulmonary, cardiac, rheumatic, gastro-intestinal, psychogenic or other disease of chronicity. An intelligent interest in these cases, a study of their social, economic and psychogenic background, their prevention and adequately prolonged treatment, followed by re-instatement into protected industry with a special view to preventing relapse—hitherto a formidable problem—by a carefully planned system of occupational therapy, vocational guidance, &c., will often so improve their morale as to make them useful, self-supporting citizens instead of a burden on the community. The pioneer efforts which the Ministry of Health are making in this direction as far as tuberculosis is concerned should be extended to other diseases of chronicity. The treatment of some of these cases may take a year or more, but their restoration to useful citizenship will be ample repayment. The time has come when, instead of allowing this large group of cases to drift into the hands of irregular practitioners, we as a profession should take up their cause, recognise their potential usefulness, and give them the interest and treatment they need.

I would put forward a tentative solution to the problem of this widespread group of diseases of chronicity. Many agree that for the hospitals of the future to be an economic proposition they should be regionalised and each comprise some 1000 beds. Furthermore they should be adequately equipped for treatment on broad sanatorium lines—that is to say, with accommodation for graded rest and exercises, vocational training, workshops for occupational therapy, &c. By all means let us have specialised units, but let them be housed in a general hospital in one coördinated system, so that the student, whether under- or post-graduate, shall be practically familiar with all the newer advances, and the patient shall have the advantages of a general hospital side by side with specialised attention. In many large general hospitals, notably those of the London County Council, the unit system is already part of the general hospital, and its team of consultants for the various units have proved to be a successful and practical proposition, auguring well for the future. I can speak with personal experience of the rheumatic unit at St. Stephen's Hospital. Here specialisation is obtained, but not in the narrow sense which is contrary to the best interests of both the community and the medical profession.

Let us, therefore, in planning hospitals for the future, take note of the Tomlinson committee on rehabilitation, and recognise, as Lord Birdwood has suggested in a recent letter to the *Times*, the three stages of rehabilitation in relation to this important group of diseases—the hospital stage with its purely medical aspects, the transitional stage combining medical treatment and industrial training, and the purely industrial side involving protected or full employment.

Wimpole Street, W.1. PHILIP ELLMAN.

PSYCHOTHERAPY AFTER THE WAR

SIR,—The Beveridge report aims at economic security for every citizen; but economic security does not necessarily provide "emotional security" and it is clear that psychology and psychological medicine have an important part to play in postwar reconstruction.

My experiences during the first two years of the war impressed on me the value of the psychological approach to general medicine and sociology. In September, 1939, I was sent to one of the London sector base hospitals, where my colleague (in psychiatry) and I were thrown into very close relationship with the other members of the staff and we had many opportunities for interchange of ideas. We all worked together with the one aim of building up a united and efficient hospital. As a result of this mutual understanding the psychological department became as popular an adjunct as the pathological laboratory and we, on our part, were often able to demonstrate a psychological aspect of the illness which was unduly invaliding the patient and retarding recovery in an otherwise simple case.

Regular clinical meetings were instituted at which medical practitioners were invited to take part in discussions and soon so many patients were being referred for opinion and treatment that regular outpatient clinics were held. Before the end of the year 1939 we had established a child-guidance clinic. Many of these patients presented sociological rather than psychiatric problems—e.g., the town child billeted on the country family, where the standards of life and morality were different. Often a simple explanatory talk to the "foster parents" and a friendly chat to the erring child would put matters right. Another group were the previously unrecognised intellectually retarded. These children were slower to adapt themselves to the new

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surroundings and their behaviour in school reflected these difficulties. We were also able to help the local probation officers in the handling of their charges, including assessing intelligence quotients and giving vocational guidance.

After a year of progress my colleague was transferred. This departure necessitated cutting out most of the research work which we had undertaken in conjunction with the physicians in evaluating the psychological factor in some groups of medical cases under observation. After a further year of ever-increasing activity I was transferred on the grounds that there was no essential EMS work to be done at the hospital and the local work was considered unnecessary because there had not been a psychiatrist in the neighbourhood before the war.

Will the Minister of Health be able to appreciate the vast amount of preventive psychological work (quite apart from the actual psychological treatment of those already broken down) which is waiting to be done and the part which this can play in the building up of a "security" within the patient? Also does he understand the readiness with which the general practitioners will coöperate in this work if the service is adequately offered?

In your issue of March 20 (p. 379) the Minister of Health is reported as saying that there were in 1939 177 mental clinics in England and Wales and that 19,000 patients attended in 1938. It would be interesting to know how many staff trained in psychotherapy were allotted to such clinics and the extent of the treatment which each patient received; for one can be quite dogmatic in stating that, in 1939, there were not available enough fully qualified psychotherapists to give really adequate treatment to such a number—advice possibly but not treatment. Are these figures representative of those upon which the future planning of psychological treatment will be based? Does the Minister of Health really believe that the 19,000 patients, as quoted, received the full benefits that really adequate treatment can give to a patient, or is he merely glossing over a grave deficiency in the country's medical services?

Bishops Stortford. D. N. HARDCASTLE.

GYNÆCOMASTIA

SIR,—Neither Richardson in his article of March 6 nor Levi in his letter of March 20 explains these cases of gynæcomastia in which there is no evidence of endocrine abnormality. They can be satisfactorily explained by a study of constitutional pathology, as J. Bauer showed 20 years ago (*Konstitutionelle Disposition*, Berlin, 1924, and *Constitution and Disease*, New York, 1942).

Sex is decided at the moment of fertilisation of the ovum by the condition of the parental chromosomes. This means that not only the sex glands and their hormones but to a great extent all other physical and mental characteristics are then determined. Secondary sex characteristics, such as the greater depth of the recto-uterine excavation in females, can be observed in the embryo before the genital glands are developed. These characteristics are therefore determined by direct chromosomal as well as by indirect hormonal influences. In insects the chromosomal sex determination is the only one, but in higher animals the later sexual differentiation of the various organs is taken over by the sex hormones. Abnormalities and disturbances of the chromosomes may bring about anatomical and functional errors of development which are grouped together as signs of intersexuality. As R. Goldschmidt has shown with his experimental work on the butterfly, *Lymantria dispar*, the chromosomal determination of sex is to be interpreted as the product of the balancing of opposing tendencies; in the one sex female tendencies predominate, in the other male. True hermaphroditism can only be understood as a disturbance of this primary chromosomal balance; the possession of testicles and ovaries at the same time cannot be explained by any endocrine abnormality. Such complete intersexuality is rare in the higher animals. Less marked cases, in which the predominance of the sex chromosomes is present but less intense than normal, are more common. In such cases only one sex gland, male or female, will develop; but disturbance in sex differentiation will be found in other organs. Moreover, when sexual predominance is subnormal the development of the genital gland of the appropriate sex may be faulty and its function subnormal. Secondary sex characteristics of the opposite sex, if present, will then be more definite because they will not be suppressed by normal sex hormones. The endocrine balance as a whole may be disturbed, and the signs of intersexuality may be augmented still further by the action of, for example, suprarenal cortical hormone.

As such minor degrees of intersexuality we must regard many cases of hypospadias, the heterosexual type of pubic hair, and gynæcomastia. Disturbance of the mitotic cell division in certain groups of cells only will explain such rarer manifestations of intersexuality as unilateral gynæcomastia, or unilateral development of the chest hair; these cases have nothing to do with abnormal endocrine action. We have therefore to distinguish between constitutional gynæcomastia, due directly to a chromosomal imbalance, and hormonal or endocrine gynæcomastia, where hereditary factors, when present, operate through the medium of the endocrine system. In the latter group are to be included cases of adrenal cortical tumour with hyperfunction exhibiting abnormal secondary sex characteristics and gynæcomastia, and of gynæcomastia after the administration of desoxycorticosterone. I hope to discuss these conditions more fully in a paper on familial intersexuality which is in preparation.

London, S.W.3. V. C. MEDVEI.

TEMPERATURE TAKING

SIR,—As nobody has commented on the letter from G. H. Zeal, Ltd., in your issue of April 17 on the labelling of clinical thermometers, I must ask for a brief space to do so.

The writer twice admits that it is misleading to engrave the time of registration as "½ min." or "1 min." on any clinical thermometer, but he pleads that long-standing trade usage and the fact that thermometers have always been so described stand in the way of any change. Yet the remedy is implicit in his letter; they should be registered as "slow," "medium," or "rapid," and it should be clearly stated that the latter varieties should be kept in the mouth for at least three minutes. To continue the present practice is a deception of the medical and nursing professions and, more important, of the housewives and mothers who go to chemists to buy a thermometer.

South Mimms. DOUGLAS MCCLEAN.

ACCIDENT SERVICES

SIR,—Having had the privilege of conversations with Colonel Cutler, I am sure he takes the segregation of fracture cases far more seriously than is implied in his note that "it is best for the peace and cleanliness of the hospital if beds are specially set aside . . . so that noisy and dirty accident cases are not suddenly thrown into the quiet of the ordinary hospital ward" (*Lancet*, May 1, p. 569). In the past such an attitude has controlled the views of some surgeons who have not been interested in fractures and who have been only too ready to get rid of such cases. The truth is that general surgical cases and accident cases are therapeutically and psychologically incompatible problems and each group have the right to suitable treatment under ideal conditions.

Princess Elizabeth Orthopædic Hospital, Exeter. NORMAN CAPENER.

SPONTANEOUS REDUCTION OF INGUINAL HERNIA

SIR,—Capt. Crowe's interesting report in your issue of April 24 leads me to describe a case recently under my care.

A man aged 58 was admitted with all the signs of an advanced intestinal obstruction and a history of generalised abdominal pain, vomiting and absolute constipation for five days. He had a right inguinal hernia which was easily reducible and the findings suggested an obstruction in the proximal half of the colon. At operation the appearances were almost identical with those described by Crowe. Strangulated but viable gut was returned to the abdomen after incision of the neck of the sac from within the abdomen. An inguinal incision revealed that the sac belonged to a direct inguinal hernia with an unusually tight neck.

The patient made an uninterrupted recovery and gave the further history of having noticed slight pain and swelling in the left groin the day before the onset of symptoms. This

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condition was present when he ascended a ladder in the course of his work. On descending the ladder the rupture reduced itself and he thought no more about it though vomiting and abdominal pain began eight hours later.

Hope Hospital, Salford. CLEMENT GRIMSHAW.

MAINTENANCE OF DEPENDANTS

SIR,—The Committee on Tuberculosis in War-time in their report (*Spec. Rep. Ser. med. Res. Coun., Lond.* 1942, No. 246) made the suggestion, now adopted by the Minister of Health (Memo 266T, April, 1943), that financial aid from public funds should be afforded to the dependants of tuberculous patients during the period of the breadwinner's invalidity. It is now more than 40 years since this suggestion was made to the corporation of the City of Manchester by their then medical officer of health, the late Dr. James Niven. A passing reference to the incident is recorded in his *Observations on the History of Public Health Effort in Manchester* (Manchester, 1923).

Ministry of Health, S.W.1. J. R. HUTCHINSON.

MEDICAL PLANNING

SIR,—We do not deny that the present medical services are far from perfect, and no member of the profession would impede any alterations calculated to achieve the maximum possible efficiency. It is the stated policy of the present government (elected in 1935) to institute a unified medical service; but approximately one seventh of the total population of these islands, selected by medical boards from a selected age-group, require the attentions (under a unified medical service) of about a quarter of the whole profession (*Lancet*, April 10, p. 469). The success of any medical service must depend on the active and willing coöperation both of the lay public and the profession; but at present the most virile section of the public (lay and professional) is disfranchised, and has not been, nor can be effectively, consulted in war-time. We suggest therefore that the present time is inappropriate for the Government to foist a new medical service upon a public, unsuspecting and gagged by the bureaucratic restrictions necessary to the successful conclusion of the war.

G. O. RICHARDSON, G. A. SMART,
DOUGLAS ROBERTSON,
Flight Lieutenants, RAFVR.

*** The Minister of Health has given an assurance (*Lancet*, April 24, p. 541) that he will publish, in advance of legislation, a statement of his proposals "which will afford all concerned an opportunity of considering and criticising them." (See also p. 630.) The British Medical Association has resolved that "every practicable step will be taken to give all members of the profession, whether members or non-members of the association, an opportunity to express their views and in particular that every practicable step will be taken to give to members of the profession on Service an opportunity of expressing their views, to assess those views, and to present them to the meeting or meetings of the representative body called to consider any proposals by the government."—ED. L.

MEDICAL HONOURS.—The MBE has been awarded to Dr. Burgess Barnett, principal medical officer of the Burma China Railway Construction, and superintendent of the Rangoon Zoological Gardens, and to Captain S. D. Sawyer, MB, of the Army in Burma reserve of officers.

Dr. Barnett was a member of the party which evacuated from Burma via the Chaukan Pass and was one of the last dozen men to be rescued from Tilung Hka. Although he is an elderly man he elected to remain with the remnants of the party until the end. He thus secured to them the medical attention they all so sorely needed. Dr. Barnett's conduct throughout this long and difficult march over uninhabited country, in the most trying conditions of the monsoon, was worthy of the best traditions of the medical service.

After retreating into Manipur with the Burma Army, Captain Sawyer volunteered to remain behind in the Naga Hills in an endeavour to extricate the many thousands of refugees who were still coming out. He served during June and July with great distinction and helped many hundreds of refugees on the Tonhe-Yaripok-Imphal route. Early in September he voluntcered to go out again, this time into the Hukawng Valley, in a final attempt to rescue those unfortunate evacuees who had been forced to spend the rains at Shinbwiyang. No other doctor was available for this duty and he remained there until the 1600 survivor shad been brought out safely to Margherita by Dec. 5, 1942. Captain Sawyer showed an outstanding sense of duty and self-sacrifice and saved many lives.

Obituary

ALAN LIVINGSTON KERR

MB LPOOL, FRCS; MAJOR RAMC

NEWS has been received of the death of Major Kerr in West Africa, where he was serving as a surgeon specialist.

Burrell & Hardman, Liverpool

He graduated at Liverpool in 1924 and besides the usual junior house-appointments he held the posts of resident surgical officer and surgical tutor at the Royal Infirmary there. When he settled in practice in Sutton he quickly won surgical reputation both among his colleagues and his patients. His interests were wide, but, probably owing to his association with the Liverpool school, he had a particular enthusiasm for orthopædics, which was turned to good account at the Sutton and Cheam General Hospital, and when the hospital's fracture service was established as a separate department he gave it his loyal, ungrudging coöperation. Two colleagues write: "Complete rehabilitation of surgical patients greatly appealed to Kerr, and it was an idea of his that such treatment should apply to all and not only to orthopædic patients.

"He willingly undertook the task of bringing up to date the hospital system of note-keeping and filing—a task uncongenial to most but which Kerr recognised as important and which therefore was done with his usual thoroughness. At staff meetings he made constructive proposals, and he thought much about medical and social problems. He had served on a PEP committee, and his fellow members of the Sutton and District Medical Society remember the part he took in their discussions on medicine in a changing world. Kerr's creed in such matters was that good health was a manifestation of good living, and that medical services should be organised to serve, help and encourage the family and so promote good living."

WILLIAM WILSON TENNANT

M B GLASG

SURGEON LIEUTENANT RNVR

Surgeon Lieutenant W. W. Tennant was lost at sea when HMS *Leda* was torpedoed on her way home from Russia last September. Born in 1909, the second son of Mr. John Tennant of Burnbank, Lanarkshire, he was educated at Hamilton Academy and at the Royal Technical College, Glasgow, where he studied for the mercantile marine service. After several years at sea he was due to sit for his second mate's certificate, when he was seriously injured in an accident on board ship off Gibralter. During his long convalescence Tennant decided to study medicine, and in 1940 he graduated MB from Glasgow University. He held the post of house-physician at Stobhill Hospital, Glasgow, till he was commissioned in the RNVR at the beginning of 1941. Back once more to the life he loved, now as a doctor, he was peculiarly fitted to look after the men at sea. A brother officer writes: "When we rescued survivors, Tennant was utterly grand in his treatment of them—and completely sincere. He would brook no interference. He saw his way and trod it firmly." He was keenly interested in the effects of exposure on the mind as well as on the body, and at the time of his death was planning to write a paper based on his own experiences.

Tennant was a tall spare man who took great pride in keeping himself fit. He was a good listener rather than a talker, but when he spoke, his slow quiet voice compelled attention. Books and music took up most of his leisure.

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THE LATE PROFESSOR WARRINGTON YORKE

In supplement to the brief obituary notice appearing last week, Sir Philip Manson-Bahr writes: "The loss of Warrington Yorke, at the zenith of his career, has come as a shock, not only to tropical medicine but also to medical science. For many years, almost for a generation, he embodied the spirit and vigour of the Liverpool School of Tropical Medicine. It was clear to all that the reputation and prosperity of that institution lay nearest to his heart. In the field of research whatever he undertook he enlightened, whether it was malaria, blackwater fever, amœbiasis, or more recently the elaboration of specific drugs. To me the name of Yorke has been a legend since my early days in Liverpool. The part he played in the famous trypanosomiasis trial at Runcorn, when he so so ably conducted his own defence, amply demonstrated his innate ability. This event coincided with my introduction to tropical medicine, and ever since then his pungent and critical attitude has proved an inspiration and corrective. To superficial observers he was coldly analytical, but he was the most kindly and congenial of men, ever helpful to his colleagues. Timorous candidates at examinations were apt to be abashed until they discovered, as we all did, that his criticisms were shafts to stimulate and not to hurt."

Writing of Yorke's part in the modern development of the chemotherapy of tropical medicine Lieut.-Colonel F. Murgatroyd recalls that for 15 years he had devoted the major portion of his time to research in this field. "He elucidated the mechanism of action of the arsenical drugs and made intensive investigations into drug-resistance and its influence on methods of treatment. He also developed a technique for maintaining trypanosomes in vitro and made fundamental observations on the metabolism of the parasites. From such studies he was able subsequently to develop a series of trypanocidal compounds of an entirely new type, the latter members of which are active against several other parasites. At the time of his death he was engaged in the preparation of a Croonian lecture on chemotherapy for the Royal Society.

"His vigorous personality and extraordinary intellectual honesty may sometimes have disguised his inherent kindliness but were a veritable inspiration to those who really knew him and above all to those who ever had the privilege of working with him."

SANITARY SCIENCE AND HYGIENE PRIZES.—The Chadwick trustees are offering three prizes—the first of £100, the second of £50 and the third of £25—for the best three essays, received before Sept. 1, on architectural, engineering and administrative principles (relative to sanitation and hygiene) which should be observed in the replanning arrangements of war-devastated towns or areas. Further information may be had by sending a stamped, addressed envelope to the clerk to the trustees, 204, Abbey House, Westminster, S.W.1.

THE BLIND AND BEVERIDGE.—Mr. Joseph Whitham, president of the National League of the Blind, speaking to a meeting of blind men and women, reported in the *Liverpool Post* of May 3, said that the Beveridge plan was designed for the able-bodied worker. The blind, among others, would become dependent on national assistance. He assumed that this would mean a maximum allowance of 24*s.* a week for a single person and £2 for a married couple. At present at least 100 local authorities were paying an average allowance of 31*s.* or 32*s.* to their blind and 21 were paying 35*s.* and over. The TUC had recommended to the Beveridge committee an allowance for the disabled of £2 a week plus dependants' allowances and free medical service, but these proposals had not been accepted.

Notes and News

IMPRESSIONS OF AMERICA

LAST autumn, at the invitation of the American Public Health Association, and thanks to the generosity of the city council, Dr. W. M. Frazer, medical officer of health for Liverpool, visited the United States and saw something of medical and public-health services there. He also had the opportunity to put a British point of view to audiences, groups, and the folk he met. The following are extracts from his report printed by resolution of the health committee and the city council:—

My impression was that the medical student is now well trained, his curriculum being rather wider than in Great Britain. There is, for example, more emphasis placed on Psychology, Mental Diseases, Preventive Medicine and Pædiatrics. The medical curriculum extends over four years, but the student has to take a course of university standard in general subjects beforehand, and he is 19 or 20 years of age before he enters on his medical studies proper, qualifying at about the same age as British students, namely, 24.

After graduation the medical graduate is compelled at most medical schools to spend a year as an internee at a general hospital where his practical experience is much widened. This is a valuable provision to which there is nothing to correspond in this country. Methods of teaching in the United States of America are perhaps more didactic and less practical than in Great Britain. Much use is made of case conferences, which are often rather formal and prolonged, and the practice of distributing typewritten or printed lecture notes is widely followed. It seemed to me that there was less ward experience in the American system of medical education than in ours. There is nothing corresponding to the British system whereby the student spends several terms as a clinical clerk or surgical dresser with definite duties and responsibilities in connexion with patients. One of the difficulties in regard to medical education in the United States of America is that there are many more students in relation to the available number of hospital beds than can readily be dealt with. This is due partly to the fact that there are, proportionate to the population, more medical men and therefore more medical students than in this country, and partly to the circumstance that many of the beds at any given voluntary teaching hospital are private or semi-private and are not available for teaching purposes.

Some of the features in the public health system in Great Britain are frankly needed owing to poverty or at least to the relatively low standard of living; in a country with a high standard of real wages like the United States comparatively few persons require assistance of this kind except during the rare periods of industrial depression. One favourable circumstance in regard to the health of the community is that American towns are not so congested with buildings as in this country—streets are wider, there is much more open space, and there is practically no smoke in the atmosphere even in the most highly industrialised cities. The last-named feature appears to me to be of great importance. No person who has not visited the United States and lived in its clean and wholesome urban areas can appreciate the enormous damage which the almost uncontrolled emission of smoke into the atmosphere does in this country—damage to health, to buildings and to furnishings and clothes. Heating in American buildings, both domestic and commercial, is almost universally central heating by oil, gas, electricity or steam relayed from centrally-situated depots. As one result of the clean atmosphere of American cities the incidence of respiratory diseases both in adults and children is very low. This is part of the explanation of the extremely low infantile mortality-rate in such highly industrialised cities as Chicago (28·8) and Detroit (30). When one considers the high infantile mortality-rates in Liverpool (82 in 1942) and other English industrial areas, the corresponding figures for some American cities appear almost unbelievable, especially as birth-rates there are usually higher than in this country.

One interesting feature in American public health legislation is that in most States, certificates of health are required from both bride and bridegroom before the marriage ceremony can actually take place. There are special medical practitioners who conduct this examination, which is mainly made in reference to the possibility of either of the parties having venereal disease. If, as a result of the medical examination, one of the persons wishing to be married is found to be suffer-

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ing from venereal disease, treatment is instituted until he or she is rendered completely non-infectious. In most parts of the United States there is legal provision for the notification of cases of these diseases and compulsory treatment, and, although there are detailed difficulties in administering these arrangements, health officers to whom I spoke were satisfied that they were an integral part of a really efficient scheme for dealing with this grave social menace. We have found in this country that United States medical personnel dealing with troops are surprised to find that no similar compulsory measures are available here.

Space is regarded as a valuable thing to have, and so every department of the typical American hospital has a large floor area at its disposal. The entrance hall alone is often much larger than the whole out-patient department in a British hospital, and I have seen records and filing accommodation in a moderate-sized American hospital which occupied as much floor space as is contained in two large wards in a municipal hospital here.

University of Oxford

Sir Edward Mellanby, FRS, has been appointed a Nuffield medical trustee in place of Mr. Douglas Veale who has resigned.

The title of Radcliffe lecturer in hæmatology has been granted to Dr. R. G. Macfarlane for so long as he holds the office of clinical pathologist at the Radcliffe Infirmary.

University of Cambridge

Prof. A. C. Chibnall, FRS, professor of biochemistry, at the Imperial College of Science and Technology, South Kensington, has been elected to the Sir William Dunn professorship of biochemistry in the university in succession to Sir Gowland Hopkins who has retired.

Mr. Chibnall, who is 49 years of age, was educated at St. Paul's School, Clare College, Cambridge, and the Imperial College. He is a PhD of London and an ScD of Cambridge. During the last war he held a commission in the Army Service Corps, served in Egypt and Salonika and later was attached to the RAF. In 1922 he was awarded the Huxley medal and a travelling fellowship from the Imperial College, and during 1923–34 he held a Seessel fellowship at Yale University. He returned to this country to become assistant in the department of biochemistry at University College, London, and he held this post till 1930 when he was appointed assistant professor in biochemistry at the Imperial College, succeeding to the chair in 1936. In 1938 he delivered the Silliman lecture at Yale and last year he was chosen as Bakerian lecturer by the Royal Society which had elected him to its fellowship in 1937. Professor Chibnall has published many papers on plant biochemistry and his *Protein Metabolism in the Plant* appeared in 1938.

At a congregation held on April 30 the following degrees were conferred :

MD.—* J. W. Parks, *T. E. Jones-Davies and H. J. Wallace.

MB, B Chir.—*L. G. Kingdom, *Brian Pownall and *Jeffrey Lomas.

* By proxy.

The title of the degrees of MB, B Chir has been conferred on H. C. Mason of Newnham and E. Tylden of Girton.

University of Glasgow

On April 17 the degree of MD with commendation was conferred by diploma on Dr. James Stewart.

Royal College of Physicians of London

On Tuesday, May 25, and Thursday, May 27, at 2.30 PM, Air-Commodore C. P. Symonds will deliver the Croonian lectures at the college, Pall Mall East, S.W.1. He will speak on flying stress.

Royal College of Surgeons of England

On Wednesday, May 26, at 3.30 PM, Mr. Victor Bonney will deliver the Hunterian oration at the college, Lincoln's Inn Fields, London, W.C.2. His subject will be the forces behind specialism in surgery.

Tuberculosis Association

On Friday, May 21, at 4 PM, this society will meet at 26, Portland Place, London, W.1, to discuss war-time diet and the tuberculous patient. The opening speakers will include Dr. H. A. Ross and Dr. C. H. C. Toussaint. The subject has been prompted by an inquiry from the secretary of the medical food-rationing committee to the Ministries of Food and Health.

The provincial meeting of the society will be held in Oxford on July 8–10. Further information may be had from the hon. secretary, 135, Harley Street, W.1.

A Russian Visitor

Prof. S. A. Sarkisov, vice-president of the Scientific Medical Council of the USSR, has arrived in this country as representative of the Soviet Red Cross and Red Crescent Societies. He has come to get in touch with our medical institutions and to arrange for an exchange of Russian and British experience in the treatment and rehabilitation of the wounded and sick. Dr. Sarkisov, who is 48 years of age, helped to organise the Moscow Brain Institute in 1926, and he is a member of the administration of the Soviet Society of Neuropathologists and Psychiatrists, of the Soviet Society of Physiologists and of the Neurosurgical Council.

British Institute of Philosophy

On Friday, May 21, at 5 PM, Mr. D. G. C. Macnabb will give a lecture under the auspices of the institute on freewill, determinism and rational choice. The meeting will be held at University Hall, 14, Gordon Square, London, W.C.1, and cards of admission may be obtained free of charge from the director of studies at that address.

Birth Control Clinics

On April 27 Edinburgh public health committee decided by nine votes to three to take no further action on the question of birth-control clinics. A subcommittee appointed to consider the provision of these clinics had reported that advice was given to women in appropriate cases at the maternity clinics, and that if further advice was needed the women were referred to the voluntary birth-control clinics.

Medical Casualty

Captain N. J. H. Davidson, MB Aberd., RAMC, has been posted as wounded.

Medical Superintendents Society

A meeting of the council of this society will be held at the Midland Hotel, Derby, on Sunday, May 23, at 2 PM.

Messrs. CIBA inform us that there are at present ample supplies of ' Percorten ' (desoxycorticosterone acetate Ciba) for all normal requirements.

Births, Marriages and Deaths

BIRTHS

BLAINE.—On May 2, at Oxford, the wife of Surgeon Lieutenant G. V. Blaine, RNVR—a son.

GROVES.—On May 5, in London, the wife of Lieut.-Colonel J. N. Groves, RAMC—a son.

NELIGAN.—On April 28, at Oxford, the wife of Dr. G. A. Neligan—a daughter.

STARKIE.—On May 1, at Northampton, the wife of Dr. E. T. W. STARKIE—a son.

MARRIAGES

CUSACK—ANGELL.—On May 7, at Weymouth, James Cusack, surgeon commander RN, of Newry, N. Ireland, to Pamela Angell, section officer, WAAF.

MUSGRAVE—HONE.—On May 4, in London, Stephen Martin Musgrave, surgeon lieutenant RNVR, to Barbara Esther Hone.

ROWAN—BRISTOW.—On May 1, in London, Michael Rowan, surgeon lieutenant RNVR, to Sidney Bristow.

SMITH—CARMICHAEL.—On May 8, in London, Reginald Farmery Smith, MRCS, of Long Eaton, Nottingham, to Helen Carmichael, MB.

DEATHS

BAKER.—On May 6, at Hindhead, William James Baker, MRCS, lieut.-colonel, late RAMC, aged 85 years.

BOOKER.—On May 4, at Witley, Surrey, Charles William Booker, FRCSE.

BROWNE.—On May 8, Elliott Sanderson Browne, LRCPI, of Haslemere, aged 92.

CHAMBERS.—On April 15, at Chard, Somerset, Alexander Jasper Chambers, MRCS, brevet lieut.-colonel, RAMC.

PERRY.—On May 3, J. C. Perry, lieut.-colonel, late RAMC.

PETTIGREW.—On April 25, at Rotherham, Yorks, Daniel Pettigrew, MRCS.

Appointments

RICHARDSON, G. B., FRCS : medical referee for county-court districts of Truro, Falmouth, Helston, Newquay, Penzance, Redruth and St. Austell (circuit No. 59).

SHELDON, J. H., MD LOND., FRCP : medical referee for county-court districts of Dudley, Walsall, West Bromwich and Wolverhampton (circuit No. 25).

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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BLOOD VOLUME IN CHRONIC ANÆMIA
BY A CONCENTRATED CORPUSCLE-HÆMOGLOBIN METHOD

JOHN MCMICHAEL, M D EDIN, F R C P E
E. P. SHARPEY-SCHAFER, M R C P

With Data from Differential-Agglutination and Dye Methods by

P. L. MOLLISON, M B CAMB, M R C P
JANET M. VAUGHAN, D M OXFD, F R C P

(*From the Departments of Medicine and Pathology, British Postgraduate Medical School, and the South West London and North West London Blood Supply Depots*)

EARLY work on the blood-volume in anæmia gave conflicting results until the careful studies of Gibson and his colleagues (1939a and b) led them to the conclusion that the total blood-volume was below normal in chronic anæmias, regardless of ætiology. However, some distinction needs to be made between anæmia due to blood-loss and anæmia from other causes. In the former, reduction in blood-volume has been found by many since Robertson and Bock (1919), while restoration of blood-volume after acute hæmorrhage in man may be slow (Ebert, Stead and Gibson 1941, Wallace and Sharpey-Schafer 1941). In patients suffering from hæmorrhage, therefore, it is difficult to ascertain whether reduction in blood-volume is part of a state of chronic anæmia or is due to recent hæmorrhage. In diseases such as Addisonian anæmia any reduction must result from physiological disturbances other than hæmorrhage. Knowledge of these mechanisms and their consequences is of practical importance when the transfusion of severely anæmic patients is under consideration.

Methods of estimating blood-volume need careful scrutiny. Plasma-volume measurement by various dyes is technically difficult and open to sources of error as yet poorly defined, while the carbon-monoxide method may be dangerous in anæmic patients. Red blood-cells are natural inhabitants of the circulation and methods depending on their dilution in the circulation may yet prove most satisfactory. The concentrated corpuscle-hæmoglobin (CC–Hb) method (Hill 1941) can be used only in anæmic patients. This paper reports the results obtained by this method and some simultaneous measurements by a concentrated-corpuscle-differential-agglutination (CC–DA) method and a dye method.

CONCENTRATED CORPUSCLE-HÆMOGLOBIN (CC–HB) METHOD
(Hill 1941)

Donor blood of suitable group was prepared by siphoning off plasma after standing. About 500 c.cm. of this blood, with a hæmoglobin concentration between 110 and 170%, was rapidly injected, the hæmoglobin of the recipient being measured before and after transfusion. The initial blood-volume before transfusion (x) was calculated from the formula $x = \frac{V(Hb_v - Hb_2)}{Hb_2 - Hb_1}$ where V = volume of blood injected in c.cm., Hb_v = hæmoglobin percentage of injected blood, HB_1 = hæmoglobin percentage of recipient's blood before transfusion, and Hb_2 = hæmoglobin percentage of recipient's blood after transfusion. The accuracy of the above formula depends on the assumptions that (1) mixing is complete and sampling accurate, (2) injected corpuscles are not lost from the circulation, (3) there are no plasma shifts. The last is the most serious possible source of error, for if y c.cm. of plasma are displaced out of the recipient's circulation before Hb_2 is estimated, then $x\,Hb_1 + V.Hb_v = (x + V - y)Hb_2$ and thus—

$$x = \frac{V(Hb_v - Hb_2)}{Hb_2 - Hb_1} + \frac{y.Hb_2}{Hb_2 - Hb_1}$$

Hill assumed y to be zero, but if y is 100 to 200 c.cm. (a loss that would be impossible to detect) then the error in Hill's formula increases as the ratio—

$$\frac{Hb_2}{Hb_2 - Hb_1}$$ increases. For example, $\frac{Hb_2}{Hb_2 - Hb_1} = 5$ if y = 200 c.cm. and then Hill's formula gives an initial blood-volume which is low by 1000 c.cm. When Hb_2 is small and Hb_2–Hb_1 is large, the possible error is decreased. The method is therefore least liable to this error in severely anæmic patients. On the other hand, if fluid is added to the circulation during transfusion, y becomes a negative quantity and Hill's formula gives a result which is too high.

The observations were made at various times of the day with the patient supine. Hæmoglobin was estimated on freely flowing ear samples by a photo-electric method (Hill and Pincock 1941). Triplicate samples were taken before and 2–6 minutes after transfusion, and in some cases further samples were taken later. Hæmatocrit readings were made in some patients, but in our hands hæmatocrit estimations are less accurate than hæmoglobin determinations. In 5 cases the transfusion was stopped when about half had been given, and hæmoglobin samples taken for estimation of blood-volume. These "midway" estimations are perhaps less satisfactory than the final estimation, since sedimentation of donor blood may occur during transfusion, but they act as a check on the final reading.

CONCENTRATED-CORPUSCLE-DIFFERENTIAL-AGGLUTINATION (CC–DA) METHOD
(P. L. M.)

Ashby (1925) suggested the application of the method of differential agglutination to the estimation of blood-volume in man. In this method recipients of groups A, B or AB are transfused with group O blood and the concentration of donor corpuscles in the recipient's blood-stream after transfusion is estimated by agglutinating out the recipient's cells in a sample, and then counting the unagglutinated donor cells. Allowance is made for the small number of recipient's cells that are not agglutinated by performing a "blank" estimation on a sample taken before transfusion. The volume and red-cell count of the injected blood are estimated, and the recipient's blood-volume is calculated from the degree of dilution of the injected corpuscles. Thus, the blood-volume at the end of transfusion is given by the formula:—

$$\text{Final blood-volume (c.cm.)} = \frac{\text{Vol. of blood transfused} \times \text{red-cell count of transfused blood}}{\text{Count of donor cells in recipient's blood}}$$

Count of donor cells is obtained by subtracting the initial count of unagglutinated cells from the count after transfusion. Possible slight alterations in the initial count as a result of blood-volume changes are ignored, because the initial count is very small compared with the count of transfused cells.

Ashby's original method has been modified by using concentrated cell suspensions for transfusion in order to minimise the blood-volume changes in the recipient, and therefore estimations by this method could be carried out at the same time as estimations by the CC–Hb method. Although the CC–DA method only enables the blood-volume at the end of transfusion to be estimated, the amount of blood transfused may be subtracted from the figure obtained in order to compare the results with other methods.

Venous samples were taken without stasis from the antecubital vein before transfusion and 3–8 minutes after transfusion (or 3–5 minutes after stopping the transfusion in the case of the "intermediate" samples). Differential agglutination was carried out by the technique advocated by Dacie and Mollison (1943). In making red-cell counts after transfusion and in counting the donor blood, never less and often more than 1000 cells were counted. The error of this method of estimating circulating blood-volume at the end of transfusion is probably similar to that of ordinary blood-counting. This may be deduced from experiments made by Mollison and Young (1940), in which differential agglutination was carried out on 31 samples, after adding known numbers of group O cells to a suspension of group B blood, a procedure similar to the in-vivo method of estimating blood-volume. The coefficient of variation was found to be ± 5%, an error similar to that of ordinary blood-counting.

DYE METHOD
(J. M. V.)

The modification of the Evans Blue method of Gibson and Evans (1937) described by Harrington, Pochin and

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Squire (1940) was used. At approximately 10 AM a sample of blood was withdrawn from a vein in the antecubital fossa without congestion: 5 c.cm. of 0·24% solution of Evans Blue dye (provided by Dr. C. M. Scott of Imperial Chemical Industries Ltd.) dissolved in normal saline was then injected into the vein of the other arm from a carefully calibrated syringe. Further samples of approximately 15 c.cm. each were withdrawn at half-hourly intervals for 1½ hours. Part of each sample was allowed to clot and part was added to dry heparin. Protein and dye concentration were estimated upon the serum, and cell-counts, hæmoglobin estimations and hæmatocrits were done upon the heparinised blood, using methods previously described (Price-Jones, Vaughan and Goddard 1935). Colorimetric readings were made with a Hellige colorimeter in the dark room. Plasma-volume was calculated by the extrapolation backwards of the three points obtained on the disappearance curve of the dye.

Repeated observations on the same individual at different dates using this method have in our hands (J. M. V.) given surprisingly constant results. Five observations made in the last eighteen months on a healthy individual have shown a mean value of 2960 c.cm., ranging from 3150 c.cm. to 2857 c.cm. Ten different estimations made on one sample showed variation in plasma-volume of 3·9%; this includes the variation in the colorimetric reading and those inherent in the different procedures involved in sampling and extraction of the dye. The biggest actual difference observed was 116 c.cm., the mean figure being 3042 c.cm.

RESULTS

Data obtained by the CC–Hb method are shown in table I. Cases 1 to 12 may be classified as chronic anæmia not due to hæmorrhage. In these cases the systolic blood-pressure was within normal limits on the occasion of blood-volume estimation, while many patients showed an increase in pulse-pressure. The venous pressure was raised above normal in cases 2, 4, 5 and 9. There had been previous hæmorrhage in cases 13 to 22. The blood-pressure was well maintained in all cases except 13 and 16, in whom hæmorrhage was probably recent and acute. The blood-volume in case 19 was estimated on two occasions three days apart and was greater on the second occasion, although the hæmoglobin was lower, possibly owing to dilution following hæmorrhage. This case may be compared with case 10, acholuric jaundice, in whom a higher blood-volume was associated with a rise in hæmoglobin. The factor—

$$\frac{Hb_2}{Hb_2 - Hb_1}$$

for multiplying any plasma-loss or gain taking place during transfusion is given for each case. It will be seen that

$$\frac{Hb_2}{Hb_2 - Hb_1}$$

is smaller in the cases of severe anæmia. Simultaneous estimations of initial blood-volume by the CC–Hb and

TABLE I—RESULTS WITH THE CC–HB METHOD

Case	Sex and age	Wt. kg.	BP	Initial hæmoglobin % Hb_1	Final hæmoglobin % Hb_2	$\frac{Hb_2}{Hb_2 - Hb_1}$	Amount transfused c.cm.	Hb. % of transfused blood	Initial blood volume (litres)	Diagnosis	Remarks
1	F 76	42·5	120/64	23·1 (23·8)	47·5 (44·7) 39·7 (38·2)	1·94	486 310*	140	1·84 (2·22) 1·88 (2·18)	Addisonian anæmia	( ) = venous blood ( ) = venous blood
2	M 77	60	120/50	14·7	30·7	1·92	390	119	2·6	Addisonian anæmia	
3	M 56	55	138/70	32·7	46·6 45·4	3·3	526 430*	126	3·9 2·72	Addisonian anæmia	
4	F 65	53	140/76	30·2	44·4 42·2	3·1	540 365*	132·6	3·35 3·30	Addisonian anæmia	
5	F 35	50·8	132/58	22·4 (10)	35·6 (16·3)	2·65	410	171 (80·5)	4·20 (4·18)	Addisonian anæmia	( ) = hæmatocrits
6	F 63	54	130/65	34·8 (35·5)	45·3 (45·8)	4·3	488	126·0	3·76 (3·79)	Addisonian anæmia	( ) = venous blood
7	M 57	67	140/65	31·5	43·3	3·6	475	135·5	3·71	Addisonian anæmia	
8	M 47	53·5	120/60	38·5	48·8	4·9	470	144	4·40	Addisonian anæmia	
9	F 45	54·2	120/60	29·4	53·2 42·1	2·2	630 340*	121·4	1·80 2·13	Reticulosis	
10a	F 61	54·2	140/60	29·8	43·0	3·0	530	113	2·80	Acholuric jaundice	
10b				37·5	47·8	4·6	514	112	3·20		12 days after 10a
11	F 46	63	132/50	47·8	60	4·7	530	132	3·12	Hypochromic anæmia	
12	M 65	61·5	140/70	32·6	43	4·1	520	116	3·65	Carcinoma of stomach	
13	F 70	64	80/?	58	71	5·4	510	126	2·15	G.I.H. acute	BP rose to 110 mm. Died 48 hr. later
14	F 42	51	120/50	25·1	41·4	2·5	525	120	2·52	G.I.H.	
15	M 38	61·5	110/74	38·6	54·7	3·4	540	140	2·86	G.I.H.	Hæmatemesis 4 days previously
16	F 42	53·5	135/76	48·8	60·3	5·25	435	115	2·06	Menorrhagia	Blood-urea 27 NaCl 496
17	F 40	59	104/64	50·1	67	3·9	560	141·2	2·46	Abortion	Acute hæmorrhage
18	F 69	54·2	124/60	30·2	41·3	3·75	530	98·5	2·73	G.I.H.	Blood-urea 30
19a	F 34	67	104/64	33·2	49·1	3·25	500	136	2·75	G.I.H.	Blood-urea 38
19b			104/64	25·5	37·8	3·07	535	111	3·20		3 days after 19a
20	F 67	37·5	158/50	28·6	34·8	5·6	460	78	3·20	G.I.H.	
21	M 65	71	115/85	53·7	63·7	6·4	280	155	2·56	G.I.H.	
22	M 46	65	120/74	44·4	53·6	5·7	532	115·1	3·55	Epistaxis	

BP = Blood-pressure. G.I.H. = Gastro-intestinal hæmorrhage. * = Transfusion stopped temporarily at this point.

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TABLE II—SIMULTANEOUS ESTIMATIONS BY CC–DA AND CC–HB METHODS

Case	Inagglutinable cell count before transfusion	Amount transfused	Red-cell count of transfused blood	Inagglutinable cell count after transfusion	Donor cells	Final blood vol. litres	Initial blood vol. litres	Initial blood vol. CC–Hb method litres	Remarks
1	9000	486	6,870,000	1,394,000 1,397,000	1,385,000 1,388,000	2·42	1·92	1·84 (2·22)	( ) = venous blood Sample 1 hour after transfusion
		310*		948,000	939,000	2·27	1·96	1·88 (2·18)	( ) = venous blood
4	15,000	540	6,020,000	850,000	835,000	3·90	3·36	3·35	
		365*		571,000	556,000	3·94	3·58	3·30	
5	14,000	410	8,580,000	837,000	823,000	4·26	3·85	4·20	
6	6000	488	6,600,000	872,000 868,000	866,000 862,000	3·72 3·72	3·23 3·23	3·76 (3·79)	( ) = venous blood Sample from opposite arm
10a	3000	530	5,710,000	946,000	943,000	3·22	2·69	2·80	
		330*		603,000	600,000	3·16	2·83		
10b	6000	514	6,510,000	937,000	931,000	3·59	3·08	3·20	12 days after 10a
22	3000	532	6,550,000	833,000 836,000	830,000 833,000	4·22	3·69	3·55	3 minute sample 8 minute sample
		352*		553,000	550,000	4·20	3·85		

* = Transfusion stopped temporarily at this point.

CC–DA methods are shown in table II and by CC–Hb, and dye methods in table III; the results correspond within 0·5 litre. Estimations of total blood-volume directly after transfusion were also made by the dye method. In two cases increase in blood-volume was apparently greater than the increase that would result from the simple addition of transfused blood, and in other cases there has been in some instances an apparent loss of fluid to the tissues. These anomalous results are being further investigated.

TABLE III—SIMULTANEOUS ESTIMATIONS BY DYE, CC–HB AND CC–DA METHODS

Case	Dye method		CC–Hb method	CC–DA method
	Initial plasma vol. (litres)	Initial B.V. (litres)	Initial B.V. (litres)	Initial B.V. (litres)
7	3·75	4·16	3·71	..
8	3·43	4·0	4·40	..
12	3·18	3·95	3·65	..
6	2·7*	3·1*	3·76	3·23

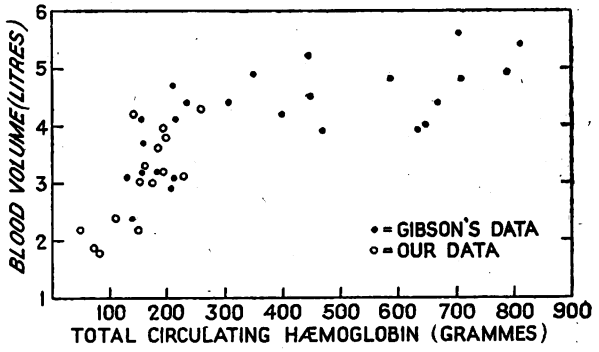
B.V. = blood-volume.
* Dye estimation made 24 hours before CC–Hb and CC–DA.

DISCUSSION

The primary object of this work was the testing of Hill's method of blood-volume determination in suitable anæmic subjects and the observation of the relationship of any blood-volume changes to circulatory dynamics. For this reason we do not lay any emphasis on the detailed hæmatological changes, the differential estimation of circulating red-cell volume, plasma volume, &c., which were studied by Gibson. Furthermore, it should be noted that the severe reductions of total blood-volume were encountered in Addisonian anæmia, severe macrocytic anæmia due to reticulosis and acholuric jaundice. The finding of a marked reduction of blood-volume in post-hæmorrhagic anæmia has, of course, an obvious explanation. We have not as yet attempted to apply the method to a series of cases of nutritional hypochromic anæmia in which the findings may well differ from those in the macrocytic types.

Applicability of the method.—As emphasised above, the theoretical possibility of plasma-loss during the injection and mixing of concentrated corpuscles may introduce quite a serious error. Injected protein solutions may disappear from the circulation within a few minutes (Sharpey-Schafer and Wallace 1942) and transfused concentrated corpuscles might displace some of the recipient's plasma. This plasma-loss might be detected by a difference in the results obtained from our CC–Hb method and the CC–DA method of Mollison which measures the blood-volume at the end of transfusion whatever plasma shifts there may have been. The fact that no significant difference has been observed in a series of estimations made by both methods indicates that in practice the CC–Hb method seems to give reliable results. The agglutinable count shows a progressive rise over 48 hours in many cases after transfusion, suggesting that initial blood-volume is regained in about this time (Mollison 1943). Calculation of plasma-volume directly after transfusion by the dye method has suggested to one of us (J. V.) that there may be plasma-loss or gain during transfusion from shift of fluid from tissues to circulation, or vice versa. Further investigation of the effects of transfusion on the dye method seems necessary as the contention that there is a gain is not supported by the agreement between CC–Hb, CC–DA and initial dye determinations.

The considerable reduction of blood-volume observed in severe anæmias was unexpectedly great, but when our findings were correlated with those obtained by Gibson, a general correspondence was found (see figure). A few of our cases had a more severe grade of anæmia than any of Gibson's, and since it appears that the more severe the anæmia the lower the blood-volume, results round 2·0 litres in a few cases by the CC–Hb method are not incompatible with previous work by other methods (Denny 1921, Keith 1923, de Wesselow and Bamforth 1928).



Cases of anæmia not due to hæmorrhage

The finding of greatest interest to us was the observation of normal systolic and rather low diastolic pressures in association with gross reduction of circulating blood-volume. In acute reductions of blood-volume figures such as we have obtained in some of our cases are associated with profound circulatory collapse. It is apparent that chronic reduction of blood-volume is associated with certain physiological adjustments which ensure a maintenance of a normal or perhaps an increased cardiac output. On theoretical grounds the most probable explanation of this would be a marked reduction of the peripheral capacity of the circulatory bed, perhaps of the capillaries and venules. Such vascular constriction may play a large part in the production of the pallor in these severe anæmias.

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From the standpoint of the shock problem this conception of physiological adjustment to marked reductions in blood-volume may be of some importance. If there are physiological mechanisms for maintaining an adequate circulation in the presence of a low circulating volume, then it may be of value to consider the possibility of seeking pharmacological methods of bringing these mechanisms into play.

SUMMARY

The total blood-volume in 22 cases of chronic anæmia was calculated by the concentrated-corpuscle hæmoglobin method. With a systolic blood-pressure within normal limits many showed a diminished blood-volume, a few as low as 2 litres. Seven simultaneous estimations by a concentrated-corpuscle differential-agglutination method gave results that agreed to within 0·5 litre. Three simultaneous estimations by a dye method showed similar agreement. Possible errors in the concentrated-corpuscle hæmoglobin method are discussed.

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VITAMIN-C SUBNUTRITION IN GINGIVO-STOMATITIS

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FROM November, 1941, to March, 1942, investigations were carried out into the vitamin-C nutrition of soldiers in hospital, with particular regard to an outbreak of gingivo-stomatitis in the Army. Most of the cases were men or women suffering from gingivitis or gingivo-stomatitis, the condition officially termed acute ulcerative gingivitis or stomatitis by the War Office.

SYMPTOMS

The dental condition before the original attack of gingivitis was generally satisfactory, and there was usually no history of other gum or dental disease directly preceding the original attack. In most cases reasonable oral hygiene had been observed. Constitutional symptoms of ill health had often preceded the gum lesions, and these were compatible with the vitamin-C deficiency discovered after the admission of the patients to hospital. The gum lesions had characteristics resembling those of scurvy. There was swelling of gum tissues, particularly the interdental papillæ; the whole gingiva was hyperæmic with an extension of the congestion to the buccal and nasopharyngeal mucosa; the gums readily bled, often spontaneously, and local pain and tenderness were prominent. Usually both upper and lower gums were affected, though sometimes the lesions were more severe in the lower jaw. Some cases were sporadic, which was against a community spread of infection by contamination. Discharge, ulceration and sloughing developed after the swollen, bleeding and sore condition of the gum had been present for variable periods in different patients, and it was at this stage that most of them came to hospital.

Such a sequence of symptoms suggests that vitamin-C subnutrition may have led to mild scurvy-like gum changes. The lowered resistance and pathological changes in the gums would render them particularly susceptible to invasion by organisms: and the septic and infective type of gingivitis would thus be secondary, not primary.

Roff and Glazebrook (1939) reduced the incidence of gingivo-stomatitis among a group of naval trainees from over 16% to under 5% by administering vitamin C; cases which did not respond fully had gingivitis of the marginal type associated with lack of oral hygiene and dental tartar. Campbell and Cook (1941) cured 14 civilian cases of gingivitis with vitamin C alone, without dental treatment. I confirmed this on a few selected early cases, but finding combined local and vitamin-C treatment to be far more effective, both were given afterwards as a routine.

METHODS

Whether lowered gum resistance due to vitamin-C deficiency favours an infective gingivitis; whether the impaired gums are merely invaded by organisms which normally inhabit the mouth; or whether vitamin-C subnutrition found in cases of gingivitis is merely coincidental are points which ought to be decided. For example, a large experimental group of soldiers in an area where gingivitis is rife could be maintained in an optimum ascorbic acid nutritional state by supplementary feeding with vitamin C, the initial doses being large enough to restore a depleted reserve quickly. This group would be compared with another subsisting on the ordinary Army diet and cooking. The incidence of gingivitis in the two groups should provide evidence of the relationship or non-relationship of vitamin-C deficiency to the present epidemic of gingivo-stomatitis.

I have investigated 74 consecutive cases admitted to hospital suffering from gingivitis or gingivo-stomatitis. Most of them showed vitamin-C deficiency of sufficient degree to justify the term subscurvy. The biochemical and other procedures adopted in the investigation were mainly those worked out by Harris and his colleagues (1935, 1937, 1942) at Cambridge.

The consecutive daily urinary outputs of ascorbic acid are estimated after daily massive doses of the vitamin by mouth. After the test dose has been taken the urine is collected over a period covering the maximum concentration of ascorbic acid excretion—that is, several hours after the dose. A routine time-table was followed: at 6 AM an oral test dose of ascorbic acid, 70 mg. per stone body-weight, was given; at 10 AM the patient emptied his bladder as completely as possible; this specimen was discarded and no further urine was passed until 1 PM, when the complete specimen voided was immediately titrated against dichlorophenolindophenol in acid solution, using the now familiar technique developed by Harris, Ray and Birch. The test dose and urinary estimation were repeated on consecutive days, until a surplus of ascorbic acid was indicated by its overflow into the urine; tissue saturation was considered to have been reached when the curve of ascorbic acid excretion showed a plateau.

The total daily ascorbic excretion is immaterial, comparison of figures over the test periods only being required; according to Harris (1940) a subject whose past daily intake of the vitamin has been adequate (25–50 mg. per 10 stone body-weight) responds by a satisfactory rise on the first or second day of test dosing. This was so in several controls taken from hospital staff. Nearly 100 cases of gingivo-stomatitis were assessed by this method, though only 74 results are given below. In the remainder, accuracy of the result could not be guaranteed owing to some fault in the procedure or collection of the specimens—usually on the part of the patient. In the 74 cases, ascorbic acid saturation was reached after varying numbers of test doses, as follows:

Dose	1	2	3	4	5	6	7	8
Cases	1	5	7	15	27	14	3	2
	Optimal		Border line		Subnormal			

Only 6 (8%) of the cases could be regarded as having an optimal (i.e. maximal) vitamin-C nutritional level on admission; 22 (30%) had borderline levels, and the remaining 46 cases (62%) had varying degrees of hypovitaminosis indicating subscurvy states. Some authorities regard saturation after the 3rd dose as indicating a subnormal level of nutrition.

Other tests included estimation of ascorbic acid in the 10 AM as well to the 1 PM urinary specimens; consecutive 24-hour urine assays after test doses; urine estimations after intravenous injection of vitamin C; and a few blood evaluations. The results agreed with the main findings. Resting values in 24-hour specimens of urine in subjects

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who had not taken vitamin C were found to be somewhat unreliable indices of nutrition; the average excretion in 50 cases over 24 hours was under 15 mg. In the whole series of tests, winter values were found to be lower than those obtained in autumn.

CASE-HISTORIES

In the following typical cases the diets are individual and do not represent the full Army ration.

CASE 1.—Vitamin-C intake before admission: one ordinary helping of potato and either swede, turnip or one tablespoonful of cabbage daily. For two months he had felt lazy, tired and irritable with headaches and malaise. Soreness and bleeding of gums followed and then the complete picture of gingivitis. He cleaned his teeth daily. Symptoms disappeared with vitamin C and local treatment. Ascorbic acid nutrition was subnormal; he required 6 test doses to establish saturation.

CASE 2.—A sergeant. Vitamin-C diet before admission was grossly deficient. Ate in civilian billets. One helping of greens two or three times a week. No potatoes. A little salad in summer. Had eaten plenty of fruit in civilian life. For a year had felt weak and had no energy. Felt the cold very much. Irritable and mentally lazy. Aches in various muscles; tender calf muscles; anorexia and insomnia. Bleeding, sore and swollen gums for 7 weeks; gums then became septic, ulcerated and sloughing. Cleaned teeth twice daily. Ascorbic acid nutrition subnormal; required 7 test doses of vitamin C to establish saturation. Striking improvement subjectively and clinically after vitamin-C ingestion. Appetite and proper sleep returned on second day of massive vitamin-C dosage. Symptoms of lethargy and apathy vanished.

CASE 3.—Vitamin-C diet before admission; usual helping of greens or swedes once daily. Potatoes daily. He had taken twice as much vegetable in civil life, besides fruit. Lack of energy, easily fatigued, and had felt run down for months. Previous attack of gingivitis lasted 5 weeks; received local treatment only; bleeding persisted after discharge from 5 weeks' treatment. Frequent colds and catarrh. Bleeding and soreness of gums stopped for first time for months after treatment with vitamin C during present attack. Constitutional symptoms disappeared. Recovered in 2 weeks with combined local and vitamin-C treatment. Ascorbic acid nutrition subnormal; required 4 test doses.

CASE 4.—Vitamin-C diet before admission: ordinary helpings of potato and greens or swedes or parsnips. Meals were sometimes kept hot for him when late. Previous attack of gingivitis; received local treatment only. Felt tired and sleepy. Unable to stand up to arduous duties; occasional joint pains; epistaxis. Local condition improved after local treatment only, but gingival soreness and constitutional symptoms persisted until vitamin C was administered some days after admission. Ascorbic acid nutrition subnormal; required 5 test doses.

Many of the other case-histories were similar. Most patients ate one helping of potato and other antiscorbutic vegetable served to them once a day in the Army.

DISCUSSION

It might be suggested that the vitamin-C deficiency found in the cases of gingivitis merely reflected a universal low level, and in fact low ascorbic acid values are not entirely confined to cases exhibiting gum lesions, as I was able to show in patients without detectable gum disease. Absolute saturation is almost certainly not essential for complete health, but the deficiencies found in most of my patients were substantial as judged by accepted standards. Apart from gum changes, petechiæ in a few and red blood cells in the urine of a few others, these patients had no manifest scurvy, and should be regarded as cases of subclinical deficiency. The exact point at which a negative vitamin-C balance becomes incompatible with health is doubtful, and in my experience varies in individuals, but constitutional symptoms referable to a deficiency suggest that these patients were below the minimal level.

A study of the Army rations indicates that adequate vitamin-C-containing foods are available in the full dietary; but they are not necessarily consumed in sufficient quantities. Most gingivitis patients stated that their intake of vegetables in the Army was less than in civil life, quite apart from the absence of fruit.

The main source of vitamin-C supply in the Army during the months concerned was leaf and root vegetables, mainly cabbage, sprouts, swedes, parsnips, turnips and potatoes. No fruit was available. Factors known to reduce the value of these foods operate in Army catering and cooking. Greens—probably unavoidably—are stored for several days, and methods of cooking are wasteful of vitamin C. Several Army cooks among the patients stated that after soaking greens they boiled or simmered them for as long as an hour, and one of them always added soda. Water in which greens had been cooked was sometimes thrown away and sometimes used for making gravy. One cook always kept the lid of his Soyer stove open. Meals are often kept hot for late-comers, or may be heated up again. Cabbage and potato, both already cooked once, may be fried together as "bubble-and-squeak" or all the vegetables may be put into an "all-in stew" or Army "brown stew" and cooked for 2–3 hours. Outer leaves of cabbages may be removed wholesale, while potatoes may be thickly peeled, so that not only the vitamin-C value of the food is reduced but the ration as well. The Army dietetic authorities recognise the various practices which lead to avoidable loss of vitamin C, and recommendations for the proper preparation and cooking of green vegetables laid down by the Accessory Food Factors Committee of the MRC have repeatedly been circulated to all responsible for Army catering; but these common practices run contrary to instructions and deprive vegetables of a proportion, or even the greater part, of their vitamin C. The result is a difference between the antiscorbutic value of the diet on paper and its value on the soldier's plate. Some refuse Army cooked greens altogether, and in my series there was one patient who ate neither greens nor potatoes.

The diet based on the Army home service ration scale is satisfactory in vitamin-C content, but the average daily intake of this vitamin calculated from reported diets of over 50 unselected cases of gingivitis was below 25 mg. and therefore insufficient. In some cases it was substantially less than this amount. A few of the patients who ate in civilian billets also took insufficient vitamin C. About 70% of all cases were stationed at gun or anti-aircraft sites.

A daily intake of 25–30 mg. is probably a reasonable estimate of the soldier's minimal requirement; in conditions of high metabolic activity it would very likely be too low, and the optimum is probably twice this amount.

Many of the stomatitis patients had been in the Army for more than a year, some without previous attacks. This would be expected, since depletion in the body reserve of ascorbic acid is likely to be gradual and subscurvy level might not be attained for a long time; besides, the deficit would be partly made good during temporary increases in the intake of the vitamin. Apart from gum lesions, many had other symptoms attributable to vitamin-C deficiency, including listlessness and lethargy, mental apathy, lessened endurance and lack of energy. Irritability was common; thus two usually even-tempered sergeants had been rebuked by officers for being impatient and short-tempered with their men, which was without precedence for either of them.

The initial gum trouble was irritation and discomfort, usually associated with bleeding. Some patients neither complained of general symptoms nor reported any increased feeling of well-being after vitamin-C medication, but those with general symptoms almost without exception were relieved.

Test dosing ensures that adequate amounts of vitamin C are given; but where this method is not used and the exact requirements of a patient cannot be ascertained, the following dosage, based on the requirements of most of my cases of gingivitis, is suggested: first week, 150 mg. of vitamin C thrice daily; second week, 50–100 mg. twice daily; thereafter, 50 mg. daily. Where there is advanced scurvy or accompanying pyrexia, larger doses may be required. The cases investigated were rarely pyrexial and had not reached a stage of general clinical scurvy. The average requirement to establish saturation was 2·5–4 g. of ascorbic acid.

The value of vitamin therapy in the treatment of the present type of gingivitis was demonstrated in the cases treated but combined local treatment is essential. Local treatment alone improves the condition but is less effective.

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Some of the patients admitted had relapsed, and had received local treatment only in previous attacks; many had received only local treatment for weeks or months without recovery, whereas they cleared up completely when local treatment was combined with vitamin C. Vitamin C alone is not usually successful where infection and sepsis have become established, which it has often done by the time the patient presents himself for attention. Vitamin C will restore a scurvy-like gum to normal, but it cannot be expected to destroy the invading organisms. Rigorous direct treatment of local sepsis is indicated. The most rapid recovery is obtained by application of antiseptics to the gums together with vitamin therapy. Vitamin C was tried alone in only a few cases where the swollen and bleeding gum margins were not yet septic. Early treatment considerably hastens recovery, and hesitation in seeking dental attention may prolong treatment out of all proportion to the period of delay.

Patients vary in their response to different antiseptics. The dyes are useful since patients themselves can apply them and the extent of the staining shows whether they have been properly applied. Gentian violet 2% was particularly effective; it should be applied to the interdental spaces by soaking pledgets of cotton-wool in the solution and probing them well into these spaces where possible. Recovery is aided by removal of impacted unerupted teeth. Areas of ulceration and stomatitis develop in association with malplaced or unerupted third molars and may obstinately persist until these are extracted. Some 20% of my cases had abnormal wisdom teeth which aggravated their condition. This figure may be high because these cases were admitted to hospital and were therefore probably more severe and refractory than the general run.

SUMMARY

Investigation of 74 consecutive military patients admitted to hospital as cases of gingivitis showed vitamin-C subnutrition in 46; in 22 the vitamin-C nutrition was borderline; it was optimal in only 6.

The outbreak of gingivitis was possibly related to a prescorbutic condition.

Symptoms long preceding an attack of gingivitis simulated those of vitamin-C deficiency, and the effects of local treatment were enhanced when supplemented with vitamin C.

A study of individual diets and methods of cooking indicates the danger of inadequate vitamin-C intake in the Army unless the stipulated rations and cooking instructions are strictly adhered to.

I wish to thank Mr. James Coventry, who supervised the dental treatment of the cases, and Mr. Harold Blunden, Miss Constance Edgcombe and Mr. John Skelding for their expert help in the laboratory.

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NECROTIC GINGIVITIS

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FOR centuries gingivitis has been associated with great bodies of men, particularly armies in times of war. A diagnosis of scorbutus was always made until towards the end of last century when Szimanowsky, Filatov, Plaut, Vincent, Miller and other workers described what we now know as Vincent's ulceromembranous gingivitis. It is well known that both scurvy and Vincent's infection have attacked the gums and mouth of fighting men, but the relationship between these diseases has not been emphasised nor have the methods of recognising and differentiating between them been sufficiently stressed. It seems highly probable that many of the cases treated as scurvy in the Middle Ages were in reality cases of Vincent's infection, and that many of the cases diagnosed as "trench mouth" in the last war were in fact manifestations of early scurvy. During the present war (1941), after several months on a newly formed camp, it was noticed that the number of men reporting with "bleeding, sore and ulcerating gums" was gradually but steadily increasing. Since routine measures did not eradicate the trouble it was decided to investigate the ætiology of necrotic gingivitis and allied conditions with a view to establishing a more satisfactory basis of treatment.

METHODS OF INVESTIGATION

Case-records.—A case-sheet was drawn up with a view to correlating minute details concerning every patient reporting with "bleeding, sore and ulcerating gums." Special attention was paid to the interrogation in regard to dietary intake and deficiencies during the previous six months, likes and dislikes, and preparation of food. The local examination of the teeth, gingivæ and oral cavities was extremely exacting and an independent observation by a dental officer was recorded. A full medical examination was carried out and particular note made of the condition of the complexion, hair, skin and mucous membranes, and also of the alimentary and skeletal systems. Smears from affected areas were made in every instance. Differential blood-counts were made in some cases and hæmoglobin estimations recorded in every case. Patients were subjected to a sphygmomanometer test on the lines of the tests devised by Rumpel-Leede and by Göthlin—the systolic pressure was taken with the rested subject in a seated position, and the cuff pressure was then maintained at a reading 10–20 mm. Hg below the systolic pressure for fifteen minutes. After releasing the pressure, the arm was allowed to hang down and observations on the area below the cuff position made for the next five minutes. Numerous "follow-up" examinations were made on each subject and both local and general examinations, together with smears, hæmoglobin estimations, and sphygmomanometer tests were repeated on every occasion.

Laboratory technique.—In order to avoid misleading preparations due to a preponderance of saprophytic bacteria, the necrotic debris was first removed from ulcerating areas and smears taken from the deeper layers of the ulcers. In cases where ulceration was slight smears were taken from gingival pockets, crevices and mucous folds. A sterile swabbing technique was observed. Fixation was by gentle heat. Prolonged staining with Ziehl-Neelsen's carbolfuchsin 1 in 200 was considered the method of choice after subjecting numerous other stains to experiment. Slides were scrutinised under the oil-immersion lens. Smears showing a few scattered Vincent's organisms were recorded as "Negative." No smear was labelled "Positive" unless both spirochætes and fusiform bacilli were present in considerable numbers throughout the smear.

Control tests.—(1) Smears from the gums of 20 subjects were examined (10 normal healthy men and 10 debilitated hospital patients). All these yielded a "negative" result, but a few scattered fusiform bacilli and Vincent's spirochætes were observed in 14 of them (70%).

(2) Several smears were taken from other forms of oral ulceration (dyspeptic and dental ulcers, tonsillitis, &c.) and proved "negative" in all cases, although scattered Vincent's organisms were observed in all smears.

(3) Attempts to infect the gingivæ of a healthy subject with Vincent's organisms failed on repeated occasions.

(4) Vitamin C excretion in the urine was estimated in several subjects before and after massive intake of ascorbic acid. The results were inconsistent.

(5) The sphygmomanometer test, as previously described, was applied to 10 normal persons. The results were recorded as generalised rubor or reactionary hyperæmia in all cases.

DETAILS AND RESULTS OF TREATMENT

Cases were grouped for treatment on the lines of the following plan.

Six main groups were thus formed and afforded a simple method of comparing the effectiveness of different modes of therapy.

Groups 1 and 3: Topical treatment.—This was carried out by a dental officer. At the first sitting all slough and debris was cleaned from the mouth and an initial scaling effected in mild cases only; in other cases scaling was postponed until the condition permitted of such interference. Hydrogen

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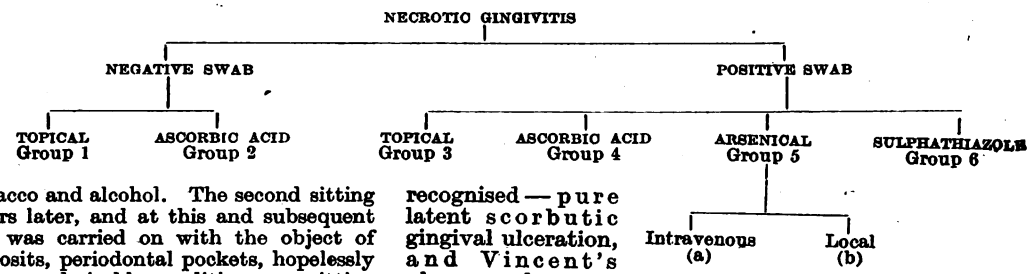
peroxide (5 vols.) was used to rinse out the mouth. Pellets of cotton-wool soaked in hydrogen peroxide (20 vols.) were then packed into the interproximal spaces for 3 minutes. After well rinsing the mouth with water, Churchill's iodine, followed by 30% silver nitrate solution, was applied to the ulcerated surfaces only. In mild and moderate cases the patient was given hydrogen peroxide or sodium perborate to use frequently as a mouth wash, and in severe cases Bowman's solution was painted on the affected areas. A laxative was prescribed and the patient instructed in oral hygiene and told to minimise the use of tobacco and alcohol. The second sitting was carried out 48 hours later, and at this and subsequent sessions the treatment was carried on with the object of eliminating all lime deposits, periodontal pockets, hopelessly decayed teeth, and other undesirable conditions permitting maintenance of disease or tending to create sites of recurrence. The patient was thoroughly impressed with the necessity for oral hygiene, gum massage and cleanliness, especially of the interproximal gingival surfaces.

Groups 2 and 4: Oral vitamin-C therapy.—To ensure a sufficient intake of vitamin C a method of overdosage was employed, as ascorbic acid is non-toxic. Ascorbic acid 600 mg. (12,000 international units) was given daily in tablet form for one week, after which 300 mg. (6000 IU) was the prescribed daily dose.

Group 5 (a) and 5 (b): Arsenical therapy.—'Mapharsen' (PDCo) was the preparation used in all cases for both intravenous and local treatment. *(a) Intravenous mapharsen:* No food was taken between 2 hours before and 2 hours after the injection. With the patient lying down the injection was made into a suitable superficial vein in the antecubital space. A fresh solution of mapharsen was injected rapidly, never taking more than 15–20 sec.); 0·04 g. mapharsen was used initially and 0·04 g. or 0·06 g. subsequently, depending on the severity of infection and the reaction to intravenous arsenic. Injections were made at 3-day intervals. *(b) Local application of mapharsen:* The mouth, teeth and gums were first thoroughly cleansed. By using a moistened, flexible, cotton-tipped applicator mapharsen powder was applied direct to the lesions and pressed into infected crevices, cracks, pockets and gum margins. No rinsing was employed after the application. Treatment was administered daily; 60 mg. mapharsen was used for first applications and 40 mg. for subsequent treatments.

Group 6: Sulphathiazole therapy.—Sulphathiazole was given by mouth in full doses with the patient in bed in hospital. Initial dosage was 2 g. followed in 4 hours by another 2 g.; thereafter 1·5 g. was given 4-hourly. Duration of treatment varied according to clinical results. An average course required some 40 g. sulphathiazole. Routine diet restrictions were enforced and blood examinations made.

Clinical observations, bacteriological studies and supplementary tests revealed that in this particular investigation two distinct clinical conditions could be recognised — pure latent scorbutic gingival ulceration, and Vincent's ulceromembranous gingivitis. Recognition of preclinical scurvy in the consulting-room is not so difficult as is usually believed, particularly if the clinician is on the look-out for it as he should be in all cases of gingivitis. The truth of this statement is borne out by studying the results of treatment (see table). The failure of topical therapy and the dramatic response to ascorbic acid in these cases indicates the correctness of the diagnosis. The following account of what are considered to be the main distinguishing features and the response to treatment in these two conditions is based on findings in this series.



RESULTS OF TREATMENT AFTER GROUPING OF CASES

Group	Treatment	No. of cases	No. cured	Remarks
	NEGATIVE SWABS			
1	Topical	14	1	The one case cured was advised on diet which had been lacking vit. C.
2	Ascorbic acid	13	12	The failure was probably a case of traumatic ulceration.
	POSITIVE SWABS *			
3	Topical	19	3	Only very mild cases were cured; 8 severe, 5 moderate and 6 mild cases were treated.
4	Ascorbic acid	9	4	All mild cases and 1 moderate were cured; 3 severe, 3 moderate and 3 mild cases were treated.
5	Mapharsen—			
	(a) Intravenous	6	6	4 severe, 1 moderate and 1 mild case were treated.
	(b) Local	3	3	1 severe and 2 moderate were treated.
6	Sulphathiazole by mouth	6	6	4 severe and 2 moderate cases were treated.
	Total ..	70	35	—

* Positive = spirochætes and fusiform bacilli present inconsiderable numbers throughout smear.

PURE LATENT SCORBUTIC GINGIVAL ULCERATION

Hypovitaminosis C is manifest by innumerable ill-defined signs and symptoms which are variable from patient to patient, but there are certain more stable criteria on which the diagnosis should be based.

(a) Dietary deficiency.—A history of a diet obviously lacking in vitamin C may or may not be present, but more important than this is to examine the actual food consumed and the method of its preparation. In this investigation the food at source was of excellent quality and of high vitamin-C content, but unfortunately most of the vitamin C was destroyed in the cookhouses by oxidation—prolonged boiling. Little or no uncooked food (particularly fruits and vegetables) was on the menu.

(b) Gums.—Bleeding from the gums of insidious onset is usually the first indication of the disease; it is for this and the accompanying halitosis that medical aid is sought in almost every case. The condition of the gingivæ is liable to be mistaken for a mild fusospirochætosis, but on close examination presents a characteristic picture. The gums are injected, swollen and atonic, tending to "fall away" from the teeth; they bleed very easily but are not extremely painful when touched in early cases. A typical sign might be termed "the gingival colour-contrast phenomenon"—the gingival margins and intergingival areas are spongy, "frosted" and of a paler hue than the basal gingival regions, which are dark bluish-purple and show up plainly as there is a distinct line of demarcation between. Marginal gingival œdema, followed by inflammatory zones along the margins and interdental crests, finally breaks down into ulcerated patches. The ulcerated areas tend to remain small and spread slowly by "creeping," forming linear tracks. The lack of an accompanying cervical adenitis in early cases of gingivitis due to hypovitaminosis C is noticeable.

(c) Bacteriological smear.—This is consistently "negative," although scattered spirochætes and fusiform bacilli are nearly always present. Necrotic debris, a multiplicity of pyogenic organisms, blood and pus cells are the normal microscopic findings.

(d) Atonia.—A generalised atonic condition of the tissues is a noticeable feature. It is seen in the gums, which retract from the teeth, but the musculature of the body in general becomes flabby, and this may even affect the posture, which is best described as "sloppy." The blood-pressure is lowered and rises rapidly to normal with vitamin-C therapy, suggesting a vascular flaccidity.

(e) Important superficial findings.—The facies is characteristically haggard, drawn, sallow and "muddy."

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A mild microcytic anæmia is nearly always present. The hair should be closely examined and the patient questioned regarding its condition—brittle, dry hair which has lost its lustre and may be falling out in quite alarming amounts is a common finding. The skin too may be unusually dry. Another important change in the skin which should be looked for is roughening of the back of the thighs and legs where there is a hyperkeratosis pilaris and often minute perifollicular hæmorrhages.

(*f*) *Further observations.*—There are other complaints and findings, the importance of which it is difficult to assess. Most patients will give a history including some such symptoms as general weakness, lassitude, loss of vigour, depression, irritability, loss of appetite or vague pains in the extremities. Loss of weight seems to bear no relation to the condition.

The clinical value of the sphygmomanometer test described is doubtful. Four types of reactions were observed. The first, considered to be a normal response, was a generalised rubor below the cuff (reactionary hyperæmia); the second was a morbilliform or "marbled" effect; the third response was the appearance of small and the fourth of large petechiæ. Of the cases of subclinical scorbutic gingivitis a third showed a normal response and two-thirds an abnormal one (1 in 9 of these showed large petechiæ and the responses of the remainder were evenly divided between a mottled reaction and small petechiæ), whereas 10 normal persons subjected to the test all produced normal reactionary hyperæmia.

(*g*) *Response to treatment.*—Of the 27 cases yielding "negative" swabs, 25 showed evidence of vitamin-C deficiency. The table shows that topical treatment produced little or no response, while ascorbic acid yielded dramatic cures in all but one instance. In subclinical scorbutic cases the injection of ascorbic acid appeared to have no advantage over the oral route.

VINCENT'S ULCEROMEMBRANOUS GINGIVITIS

The clinical characteristics of fusospirochætal infection of the gums are well known; certain details, however, deserve special mention. Two main types of cases are met with—those presenting an acute and severe infection, usually in a febrile patient; and those of a chronic nature with an insidious or acute onset. Certain pathognomonic findings make the diagnosis simple in well-developed cases; it is in mild cases that difficulty is liable to be encountered.

(*a*) *Gums.*—In the initial stages all that can be seen is localised œdema with bright red patches superimposed. These hyperæmic areas break down, forming irregular ulcers covered with a yellowish-grey slough. On removal of this "pseudo-membrane," a raw surface is revealed which bleeds briskly. The distribution of lesions may be divided into two main groups—local and general. In the latter a "herald" lesion is apparent in the first instance, a favourite site being behind the third lower molars. The ulcers appear in situations where anaerobic incubation may be expected—mucous folds, crevices, periodontal pockets and cracks—and probably for this reason "trench mouth" does not occur in the edentulous. The gingival margins are by far the most common sites of ulceration. Gingival ulceration may spread to the cheeks, lips, tongue or palate (ulcerative stomatitis), or pharyngeal region and tonsil (Vincent's angina). The gums are extremely sensitive and much importance is placed on this as a clinical test. There is a characteristic sickening fœtor. Cervical adenitis is usually pronounced.

(*b*) *Microscopical appearances and occurrence of organisms.*—On sectioning a typical ulcer the upper surface (pseudo-membrane) consists of a mass of necrotic debris in which are entangled a few spirochætes, a considerable number of fusiform bacilli and a multiplicity of "secondary invaders." Beneath this, fusiform bacilli predominate and in the deep layers the tissues are found to be teeming with Vincent's spirochætes. Smears taken, as previously described, show that in the healthy mouth Vincent's organisms may be found in small numbers and are scattered. In general debility, vitamin-C deficiency and other forms of oral and gingival ulceration there is a considerable increase in their numbers, but the organisms are still scattered and produce no uniformity throughout the smear. In trench mouth the appearance of the smear is uniform and the severity of the case appears to be directly proportional to the number of spirochætes present.

(*c*) *Response to treatment.*—Of the cases with positive swabs, three-quarters showed evidence of hypovitaminosis C. The table shows the results of treatment in the series. For simplicity, cases of Vincent's gingivitis were graded as mild, moderate or severe. Briefly, it may be said that topical therapy and ascorbic acid sometimes cured mild and moderate cases, but that the results of treatment were inconsistent. Topical treatment was slow and ineffective in that it was liable to drive a severe case into a chronic stage. Massive sulphathiazole therapy, although slow, gave satisfactory results, but further research with this drug is necessary. Mapharsen by direct application on localised lesions, and intravenously if the lesions were generalised, gave dramatic and swift results in all types of case. The addition of ascorbic acid by mouth hastened recovery, prevented recurrences and promoted a healthy condition of oral tissues after the infection.

DISCUSSION AND CONCLUSIONS

Latent scorbutus scurvy is an important condition on account of its frequency and insidious effects. Thus studies in subjects whose diets were believed to be fairly satisfactory revealed an incidence of 30–40% (Youmans 1941). In spite of a tremendous amount of research little is yet known of the factors influencing the absorption, assimilation and metabolism of vitamin C. In this investigation it appears that the food was prepared in an unscientific manner and that practically all the vitamin C was destroyed by oxidation. Tests of vitamin-C excretion in the urine here proved impracticable, and subclinical scurvy should not be solely a laboratory diagnosis.

The specificity of the *Borrelia vincenti* and *Bacillus fusiformis* as causative organisms is controversial. Some authorities consider these organisms to be non-pathogenic and suggest that the infected areas afford a suitable medium for their rapid growth. It seems most probable that they flourish in symbiosis and are specific—their presence in trench mouth is constant and they never occur *in such large numbers* in any other form of oral or gingival ulceration. It is said that both bacilli and spirochætes have been cultivated under anaerobic conditions, and that the independence of the two organisms has been demonstrated (Dible and Davie 1939). Other observers believe that the fusiform bacillus is an embryonic form of the spirochæte (Buehler 1920), and distinct transition, after cultivation, from bacillus to spirochæte is said to have been seen (Tunnicliffe 1919); certainly smears usually exhibit great pleomorphism of the fusiform bacillus which supports such a view, and it is further supported by the fact that fusiform bacilli predominate early in the disease while spirochætes swamp the field in advanced cases.

Whether or not the symbiotic theory is correct, there is no doubt that the environment of the organisms is the most important factor—lowered gingival resistance, anaerobic conditions and the presence of other organisms are favourable for the rapid growth of Vincent's organisms. Tunnicliffe, Fink and Hammond (1936) demonstrated that Vincent's organisms became pathogenic when the tissue vitality in dogs had been impaired by the injection of 'Scillaren' B, whereas in this investigation it was impossible to infect a healthy mouth with the organisms. The usual list of predisposing factors includes periodontal pockets, carious teeth, ill-fitting dentures, food impaction, unsatisfactory oral hygiene, over-smoking and many others; but the most important predisposing cause, latent scurvy, is not so widely recognised. Vitamin-C deficiency produces a lowered gingival resistance with atonia and consequently gingival pockets are formed suitable for anaerobic incubation. Once Vincent's ulceration is superimposed there is little chance of satisfactory healing in the hypovitaminotic subject; thus a large proportion of cases require treatment for the deficiency as well as for the infection. It is possible that Vincent's infection interferes with vitamin-C absorption and so sets up a vicious circle by furthering the deficiency. The prevalence of Vincent's ulceromembranous gingivitis where "herding" exists—in camps, barracks, trenches and other such communities—may be partly due to the handing on of infection through

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cutlery, mugs, eating utensils and such like, but since healthy gums cannot be infected infection will only occur in communities where there is a generalised lowering of gingival resistance, due to lack of oral hygiene, fatigue and above all latent scurvy.

In camps, barracks and other communities personnel should use their own mugs and cutlery and special arrangements should be made for the sterilisation of all eating utensils. The food-supply and its preparation must be closely supervised and an adequate intake of vitamin C ensured—the incidence of gingivitis in an institution fell by 50% when daily orange juice was given (Hawke 1933).

Successful treatment in Service personnel is handicapped by patients moving from camp to camp, and by their failure to report early. Treatment by most of the standard topical applications is likely either to create a chronic condition or to invite recurrences. This may be due to the destruction of superficial organisms while active organisms still lie deep in the tissues—the powers of penetration of the Vincent's organisms are well established (Cahn 1929). It is interesting to note that when treated with mapharsen the spirochætes disappear from the lesions less rapidly than in syphilis. For mild cases, topical therapy—30% silver nitrate in conjunction with Churchill's iodine—is strongly advocated. To paint the affected areas with Bowman's solution (equal parts of vinum ipecacuanhæ, liquor arsenicalis and glycerin) is an excellent remedy. Effective mouth washes are hydrogen peroxide and sodium perborate solution. For moderate, severe, and recurrent cases mapharsen therapy should be employed. In cases with isolated lesions daily application of mapharsen powder 4–6 mg., and in generalised cases mapharsen given intravenously, 0·04–0·06 g. at three-day intervals, will effect a rapid cure Ascorbic acid in large dosage should constitute a routine part of the treatment: 600 mg. daily is suggested for the first week, and subsequently 300 mg. daily.

SUMMARY

From a study of 70 cases of necrotic gingivitis in Service personnel, gingival ulceration due solely to latent scurvy and Vincent's ulceromembranous gingivitis are described as separate clinical entities. Recognition should be possible without excretion tests. Correct interpretation of bacteriological smears is of paramount importance. Vincent's infection should be diagnosed only when both spirochætes and fusiform bacilli are present in large numbers throughout the smear.

In camps, barracks, and other communities prevention will be by strict attention to vitamin intake, provision of separate mugs and cutlery for each man, and frequent sterilisation of all eating utensils.

Treatment of all cases should include 300–600 mg. ascorbic acid daily. For mild cases of Vincent's infection local applications of silver nitrate and iodine with mouthwashes are advocated; more severe cases require mapharsen, either locally as a powder or intravenously.

Thanks are due to Captain W. G. Bruce of the Canadian Dental Corps for checking cases and for his collaboration in connexion with topical therapy; to Air-Commodore R. W. Ryan, director of medical services, Royal Canadian Air Force, for permission to publish details of this investigation; and to Abbott Laboratories Ltd. for supplies of ascorbic acid.

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IRON MEDIA FOR CULTIVATION OF ANAEROBIC BACTERIA IN AIR

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THE proper study of the anaerobic bacteria encountered in the practice of clinical bacteriology is hampered by the difficulty of maintaining the number of anaerobic jars needed to accommodate all the test media. However, fluid media exposed to air can be made to support the growth of anaerobes by the addition of certain substances whose efficacy, at any rate in part, depends on their power to produce and maintain in the fluid a reducing intensity high enough to counteract the growth-inhibiting action of the oxygen diffusing in from the air. Substances permitting this "aerobic" cultivation of anaerobic bacilli have been known for some time. One of them, thioglycollic acid, has recently been made the basis of a useful routine medium, thioglycollate-agar-broth (Brewer 1940). But though the use of this medium leaves the available anaerobic jars free for plate cultivation, its preparation is an added burden to a laboratory service, especially in field laboratories, where pathologists work with a minimum of stock media.

The special preparation of thioglycollate broths, thioglycollate sugars, &c., may be avoided by maintaining in sterile bottles a stock suspension of 0·5% agar in a 1% solution of sodium thioglycollate in broth. One volume of the melted stock is added to every 9 volumes of broth or the peptone-water sugar, required for anaerobic culture, the resulting medium heated for ten minutes at 100° C. to expel air, and cooled quickly before inoculation. We have tested media so prepared, and find them as effective as media prepared in bulk by Brewer's method. However, the thioglycollate, both in the concentrated stock and in the final medium, tends to deteriorate, and fresh samples must be made up at intervals by the exact neutralisation of thioglycollic acid with sodium hydroxide. For field work, a more stable and simply prepared agent is desirable. Without claiming that it has all the advantages of thioglycollate plus agar, we suggest that strip-iron meets the requirements of the laboratory worker in these respects.

In 1917 Douglas, Fleming and Colebrook found that broth to which a rusty nail had been added would support the "aerobic" growth of *Clostridium œdematiens* and *Cl. butyricum*. Hastings and McCoy (1932) employed powdered iron reduced by hydrogen for the "aerobic" growth of anaerobes in milk. Spray, following a suggestion by Dunham (see Spray 1936) substituted a simple strip of iron sheeting for the prepared powder, and devised two test media, iron-milk and iron-gelatin, for use in the identification of clostridia. We have extended Spray's use of the iron strip, and find that it converts plain peptone water into a medium that readily supports the vigorous growth of the most fastidious clostridia.

Preparation of the media.—The fluid media, peptone water, sugars, milk, &c., required for the test of an anaerobe, preferably contained in narrow test-tubes, are heated in a boiling-water bath to expel air, and cooled quickly with the minimum of disturbance. Strips of sheet mild steel ("sheet iron," gauge no. 26) measuring about 3 × 25 mm., are dropped into each tube. The strips may be kept loose, and sterilised by flaming immediately before use, or, after dry sterilising, may be maintained indefinitely in a dry screw-capped bottle. A small degree of superficial rusting of the strip is immaterial. The strips may later be recovered from the medium, and used repeatedly until they begin to disintegrate. Nails may be used, and cast-iron or mild steel filings, but the upright column of iron in the narrow tube is more effective than the filings, whose active surface after sedimentation is small and confined to the bottom of the tube.

Effect of iron strips on broth and peptone water.—If an iron strip is added to a tube 15 mm. in diameter, containing 10 ml. of peptone water (1% 'Difco' proteose

* In receipt of a grant from the Medical Research Council.

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peptone in 0·5% sodium chloride) at pH 7·2, and the mixture incubated at 37° C., a light precipitate—presumably of iron hydroxides—is visible on the iron after 30 minutes. At this time the reducing intensity in the medium is sufficient to decolorise 0·0005% methylene-blue to a distance of 2 mm. from the surface of the metal. After one or two hours, the precipitate is diffused throughout the medium and at this stage methylene-blue is decolorised to within a few mm. of the fluid surface; in narrow tubes, this degree of decolorisation is maintained for at least 4 days. After 24 hours there is a heavy deposit of precipitates on the iron and at the bottom of the tube. The pH has by this time risen to 7·8, where it remains for several days. When anaerobic bacteria are growing in the tubes the turbidity is greater by reason of the precipitate and the suspended bacteria. Some species produce blackening of the iron and of the precipitate, and the medium is thereby darkened. If a fermentable sugar is present, the acidity that develops from these species prevents blackening, and fermentation can usually be detected by an absence of blackening as well as by colour change in the indicator. As with anaerobic bacteria in other sugar media, the indicator may be irreversibly decolorised, and the results of fermentation tests should be checked by adding a loopful of culture to a drop of brom-thymol blue on a white plate; the concentration of the pale or the blackened precipitates in iron media is never great enough to mask the colour changes on the white plate.

Germination of anaerobes in iron media.—The chief drawback to the use of iron media is the difficulty in detecting early bacterial growth; the precipitate masks the bacterial turbidity. If absence of changes attributable to fermentation is safely to indicate lack of a particular fermentative power, and not merely lack of growth, the medium must be capable of inducing good growth from moderate inocula of the most fastidious anaerobes. The growth-promoting capacity of iron-peptone was tested as follows.

Graded, viable-counted inocula of *Cl. tetani* and *Cl. œdematiens* were seeded each into iron-peptone water, thioglycollate-agar-peptone water and thioglycollate broth; the first two were incubated in air, the other in the anaerobic jar. The minimal inocula giving vigorous growth were:

	Cl. tetani	*Cl. œdematiens*
"Aerobic" iron-peptone water	12	500
"Aerobic" thioglycollate-agar-peptone water	(not tested)	300
Anaerobic thioglycollate broth	about 1	5

Having regard to the notorious difficulty of cultivating *Cl. œdematiens*, vigorous growth in peptone water from 500 organisms must be considered good. In another similar test, 100 viable *Cl. œdematiens* readily established themselves in iron-peptone water. The "aerobic" thioglycollate-agar-peptone water was about as sensitive as the iron-peptone water.

In addition, small inocula of the following species were made directly into iron-peptone water from stock cooked-meat cultures; all grew vigorously; the figures indicate the number of strains tested; *Cl. welchii*, 6; *septicum*, 6; *œdematiens*, 6; *histolyticum*, 2; *tetani*, 6; *tertium*, 6; *sporogenes*, 9; *bifermentans*, 6; *multifermentans* type, 5; *chauvoei*, 2; *hastiforme*, 6; 4 strains of *Fusiformis* recently isolated from human pathological material, kindly supplied by Dr. C. Barwell; and 4 strains of obligate anaerobic streptococci of the non-proteolytic type, isolated from human pathological material. From actively growing cultures of dextrose-fermenting clostridia, even a wetted wire carried enough viable organisms for establishing growth in dextrose iron-peptone water. It appears, therefore, that growth in this medium may be confidently expected from moderate inocula of anaerobic bacteria.

Fermentation reactions.—The fermentation reactions of one each of the clostridia listed above, and of all the fusiformis bacilli and anaerobic streptococci, were tested in iron-peptone water sugars and found correct. They included acid and gas production in dextrose, lactose, sucrose, salicin, the indole test, reduction of nitrates, and gelatin liquefaction; the positive results developed within two days. It should be noted that the vigour of the growth in iron-milk and iron-gelatin may alter the characteristic reactions of anaerobic bacteria that are to be expected in plain milk and gelatin. These altered reactions, and the blackening produced from the iron by some species, form part of the basis of a classification of the clostridia described by Spray (1936).

CONCLUSIONS

Strips of sheet iron (which is a heat-resistant, moderately pliable type of rolled mild steel) have a remarkable stimulating effect on the growth-promoting properties of simple solutions of peptone for anaerobic bacteria. The mode of action of the iron is probably complex.

The maintenance of a stock of dry strips of sheet iron is a simple matter, and broths or peptone waters from which air has been expelled by heating are converted by the strips into excellent "aerobic" media for biochemical tests of anaerobic bacilli, both sporing and non-sporing, and of anaerobic streptococci.

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SULPHAPYRIDINE ANURIA

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MAJOR RAMC

AN African, aged 30, was admitted to a general hospital on Dec. 1, 1942. He had been disembarked from a troopship with the diagnosis of right lobar pneumonia. The temperature had been 103° F. on Nov. 30 and 5 grammes of sulphapyridine had been administered over 24 hours.

On admission his condition was satisfactory. Symptoms and signs were slight, consisting of cough with some sputum and pain in the right side of chest. Four days later, on Dec. 5, a temperature of 103° F. was recorded, the pain in the right side became worse and signs of pneumonia were noted in the right lower lobe. Sulphapyridine therapy was recommenced. He was given 2 g. at once and 1 g. four-hourly until 16 g. had been taken, making 21 g. in all.

On Dec. 7 he complained of colicky pain on both sides of the lower abdomen. This pain increased and urine output decreased rapidly. At midnight catheterisation of the bladder yielded nothing but two drops of blood. At 1 AM next day intravenous 5% glucose saline was started and a total of 1080 c.cm. had been given by noon when 4·28% sodium sulphate was substituted. No urine was passed.

At 5 PM the right ureter was catheterised, with immediate flow of clear urine from the ureteric catheter. Catheterisation of the ureters was difficult, as has been noted by others (Bailey 1942), and failed on the left side. A local anæsthetic was used, aided later by a general anæsthetic. The urine contained erythrocytes, leucocytes, epithelial cells and scanty granular casts; no crystals were seen. The bladder showed acute cystitis with submucous hæmorrhage especially round the ureteric orifices which were deformed by swelling. There were whitish crystals in abundance in the bladder and these adhered to the tip of the catheter as it was manœuvred into the ureter. 50 oz. of urine was collected from the catheter in the next 12 hours, and after 24 hours the total had risen to 89 oz. The patient was much better.

A further cystoscopy was performed under spinal anæsthetic on Dec. 10, with the object of catheterising the left ureter, but it was found that both ureters were excreting well and that the condition of the bladder was improving. The catheter was removed from the right ureter. The ureteric orifices, especially on the left side, were still somewhat deformed by œdema. Subsequent progress was satisfactory.

Sulphapyridine, sulphathiazole and sulphadiazine are more prone to cause anuria than sulphanilamide. The sequence of events in these cases is as follows: Sulphonamide therapy; low fluid intake; precipitation of acetylated sulphonamide in the renal tract (especially at the lower end of the ureters) leading to oliguria and finally blockage of the ureters. There is an associated acute hæmorrhagic inflammation of the kidney, renal pelvis, ureter and bladder, especially affecting the lower ureter and bladder. The findings in a fatal case are well described by Carson and Smith (1942).

* An obituary notice of Major Kerr appeared in last week's issue.

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The complication is rare, preventable and curable. There have been few reports, considering the immense world-wide use of sulphonamides: Laird (1941) quotes nearly 800 cases of gonorrhœa treated with sulphapyridine with only 5 cases of hæmaturia and 1 of anuria. But this rarity does not make the condition unimportant; deaths from anuria, like deaths from anæsthetics, are unusual but none the less tragedies when they occur.

There are three effective methods of prevention.

(*a*) During therapy the fluid intake must amount to not less than 3000 c.cm. every 24 hours.

(*b*) The urine should be rendered alkaline, because the acetyl derivative of sulphonamides form more readily in an acid medium.

(*c*) The use of sulphonamides should be restricted to suitable cases, and they should be administered in adequate doses and continuously. The practice of giving a few tablets on chance is inexcusable, for it may render renewal of sulphonamide therapy dangerous and useless.

A close watch should be kept for hæmaturia and anuria. If anuria develops it can be cured by prompt ureteric catheterisation. Laird (1941) suggests that catheterisation should be performed after 12 hours' anuria. In the present case no urine had been passed for 20 hours.

The amount of sulphonamide that may cause anuria may be as low as 5 g. if the fluid intake is inadequate (Laird 1941). It is perhaps noteworthy that this case and the one reported by Benson and Percival (1942) were received from ships. The supply of drinking-water in ships does not always permit of a ration of 4–5 pints per day for each sick person.

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ANURIA FROM TUBULAR AND URETERIC OBSTRUCTION

FOLLOWING SULPHAPYRIDINE THERAPY

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THIS case is reported under the above title in order to emphasise the rôle of obstruction in sulphapyridine anuria and to link it with the similar clinical picture seen after transfusion of improperly matched blood or after sudden decompression of the bladder.

CASE-RECORD

A soldier, aged 20, previously healthy, was admitted to a northern EMS hospital with lobar pneumonia. On Nov. 25, 1942, a course of sulphapyridine 1·0 gramme 4-hourly by mouth was begun. On the 26th he had backache, and on the 27th he passed 15 oz. of blood-stained urine in 24 hours. Sulphapyridine was stopped after a total of 10·0 g. had been taken and fluids were pushed, with potassium citrate 30 grains 4-hourly. The urine showed crystals of acetylated-sulphapyridine with a total content of 170 mg. of the drug per 100 c.cm. No casts were seen. On the 29th oliguria continued, hæmaturia became more profuse, and the patient had to be given morphia and atropine for repeated attacks of right-sided renal colic. Only 9 oz. of urine was passed next day and it was very bloody. By Dec. 1 complete anuria had supervened. He had been vomiting since taking the sulphapyridine.

The temperature was then 99° F., the pulse-rate 92, the respiration-rate 22, and the blood-pressure 160/100. The patient was flushed, drowsy and sweating, with a furred tongue and uræmic breath. There was tenderness over both loins, some abdominal distension, but no signs of œdema. Radiography of the renal tract showed no opaque calculi. Blood-urea was 75 mg. per 100 c.cm.

On cystoscopy no urine was found in the bladder, and the mucosa was normal. Scattered over the trigone were white highly refractile stellate crystals. Both ureteric orifices were œdematous, not contracting and blocked by brown spiky masses projecting for about 3 mm. from the end of each ureter. After repeated washings of the bladder, these projecting masses were cleared and a ureteric catheter was passed up the left ureter, which clinically had become obstructed last. Some difficulty was experienced in passing the catheter for the first 7 cm., and on reaching the pelvis of the kidney, dirty brown urine spurted from the catheter in a continuous stream. The kidney immediately began to secrete and the urine was collected every 2 hours. The biochemical findings are shown in the table.

An intravenous glucose saline drip was started and sodium bicarbonate gr. 30, was given hourly by mouth as the urine was still acid. The patient improved steadily except for a

TABLE OF URINARY FINDING WITH CORRESPONDING BLOOD-PRESSURE AND BLOOD-UREA

Date and time	pH	Volume (c.cm.)	Specific gravity	Albumin	Urea (g. per 100 c.cm.)	B.P.	Blood-urea (mg. per 100 c.cm.)	Deposits
Dec. 1								
4 PM	..	..	..	..	..	160/100	75	..
6 to 8 PM	6·0	160	1006	Light cloud	0·7	..	..	Few rbc and wbc; acid hæmatin.
8 to 10 PM	6·0	130	1006	Ditto	0·8	..	..	Ditto
10 to 12 PM	6·0	125	1007	Ditto	0·8	..	..	Few rbc and wbc; some epithelial cells.
Dec. 2								
12 to 2 AM	6·0	140	1008	Ditto	0·9	..	..	Few rbc and wbc; a number of hyaline casts.
2 to 4 AM	6·0	90	1008	Ditto	1·2	..	..	Few rbc; many hyaline casts.
4 to 6 AM	6·0	100	1010	Ditto	1·3	..	..	Fewer rbc; still many hyaline casts.
6 to 8 AM	6·0	110	1010	Ditto	1·6	..	..	More rbc; few hyaline casts.
8 to 10 AM	6·0	70	1010	Heavy cloud	1·8	..	..	Many rbc; few wbc; no casts.
10 to 12 AM	6·0	75	1010	Light cloud	1·75	..	..	Few rbc; occasional hyaline casts.
12 to 2 PM	6·5	125	1010	Ditto	1·8	..	..	Few rbc; no casts.
2 to 6 PM	6·5	150	1010	Ditto	1·85	180/120	65	Few rbc; few blood and hyaline casts.
6 to 10 PM	7·0	140	1010	Trace	1·9	..	..	Ditto
Dec. 3								
10 to 2 AM	6·0	125	1012	Ditto	2·1	..	..	Ditto
2 to 6 AM	6·0	50	1012	Ditto	2·4	..	..	Ditto
4 PM	..	..	..	..	..	180/120	28	..
Per urethram Dec. 2								
4 PM	6·0	950	1010	Heavy cloud	0·9	..	..	Some rbc; many pus and epithelial cells; blood pigment casts.
Per urethram Dec. 3								
2 AM	6·0	200	1010	Ditto	1·7	..	..	Rbc and wbc; no casts.
6 AM	5·5	150	1012	Ditto	2·1	..	..	Many rbc and wbc; scanty hyaline and granular casts.
Dec. 4	..	..	..	..	..	160/120	20	..
Dec. 6	..	..	..	..	..	150/100	..	..
Dec. 9	..	..	..	..	..	140/85	..	..
Dec. 12	9·0	..	..	None	..	110/65	..	No casts; triple phosphate crystals.

Sugar: negative result. Rbc = red blood corpuscles. Wbc = white blood corpuscles.

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rise in blood-pressure to 180/120 on the following day (Dec. 2) with some visual symptoms. By the 14th his blood-pressure was down to 115/65, and the urine was completely normal. The ureteric catheter was removed after 48 hours and cystoscopy showed both kidneys secreting well.

DISCUSSION

Although much has now been written on this subject, there is still some doubt about the pathology and treatment. In the above case the final cause of anuria was undoubtedly a mechanical block in the lower portion of the ureters. This is shown by :

1. The cystoscopic findings, especially urine spurting under pressure from the ureteric catheter on the latter reaching the pelvis of the kidney.

2. The immediate secretion of urine by the left kidney with absence of secretion from the right kidney until at least 24 hours later.

It is interesting to note how the kidneys responded, the right following the left after an interval, first by secreting a dilute urine and later concentrating normally. The fact that, as the concentration increased, the volume did not much decrease, suggests a gradual opening up of tubular units. Although the urine in the first specimens closely corresponded to plasma, the absence of glucose from it showed that the tubular epithelium was still active. The gradual opening up of tubular units would mean a slower passage of filtrate through the tubules with resultant increase in concentration, which fits in with the findings shown in the table. Examination of the deposits also suggests glomerular damage secondary to mechanical obstruction, rather than an acute toxic tubular nephritis. The rise in blood-pressure after the left kidney had begun to clear the blood of metabolites may be explained by the right kidney remaining obstructed. The blood-pressure started to fall when both kidneys began to secrete, and it remained high when the urine was normal.

The sequence of improvement was as follows :

1. Filtration by the glomeruli
2. Absorption by the tubules, with gradual clearance of blocked tubules.
3. Disappearance of red cells and casts from the urine.
4. Disappearance of albumin from the urine.
5. Return to normal blood-pressure.

No calculi were recovered, but the obstructing agent was presumed to be a conglomerate mass of blood-clot, acid hæmatin and sulphapyridine acetylate. It has been shown (Antopol et al. 1941) that acetylated sulphonamides precipitated in the collecting tubules can cause degeneration and hæmorrhage in the kidney. The history of the above case agrees with the view that the primary change is precipitation of the insoluble acetylate in the renal tubules. This is likely to occur in febrile states with inadequate fluid intake and vomiting. Renal congestion and hæmaturia follow, and a vicious circle is set up. Owing to the acidity of the urine usual in these cases, acid hæmatin is also precipitated in the tubules, leading to further tubular block, oliguria and hæmaturia. Hyaline casts will also help to block the tubules. Finally, blood, acid hæmatin and crystals of sulphapyridine acetylate block the ureters and cause complete anuria.

It is necessary to look out for the early clinical picture, with true renal pain deep in the loins and microscopic hæmaturia. This complication is quite common, usually within 48 hours of first giving the sulphapyridine. From the time the condition is recognised, no more sulphapyridine should be given by mouth ; if the drug must be given at all the soluble salt can be injected by intravenous drip. In the case recorded sodium bicarbonate was administered as a means of quickly making the urine alkaline so as to prevent precipitation of acid hæmatin in the tubules, and also because sulphapyridine acetylate is more soluble in an alkaline than in an acid medium. On reflection, it would have been much better to have given 5% glucose instead of normal glucose-saline, for this would have given the damaged kidneys about 60 g. less salt to deal with, corresponding to 12 pints of intravenous fluid in 48 hours.

SUMMARY

A case is described in which a young man with pneumonia developed anuria after taking 10 grammes of sulphapyridine. His condition is attributed to mechanical blockage of the renal tubules and ureters by crystals of the acetyl salt of sulphapyridine precipitated in a relatively scanty acid urine.

The treatment recommended for such cases is catheterisation of the ureters, with administration of 5% glucose intravenously and sodium bicarbonate by mouth.

I would like to thank Dr. D. H. Collins, medical superintendent, for permission to publish this case and for his general help; Dr. K. Hardy, RMO, for facilities for investigation; and Mr. W. H. B. Vincent for his laboratory work.

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SULPHAPYRIDINE ANURIA AND ITS TREATMENT

W. A. FLYNN, M R C S
MAJOR RAMC

THE value of massage of the renal tract in cases of anuria following the use of sulphapyridine was demonstrated for the first time, so far as I know, by Major Laird at the beginning of last year. The patient had been treated with M&B 693, one gramme four-hourly day and night, commencing with an initial dose of 3 g. He showed some signs of intolerance, including malaise, nausea and vomiting. On the second day hæmaturia was followed immediately by anuria. The drug was stopped and he was pressed to drink as much water as possible. In view of the vomiting, saline was administered by intravenous drip, and 500 c.cm. was given in some six hours. Soon after the infusion was started, renal colic set in and within an hour it became bilateral. The blood-pressure and blood-urea rose and it was decided to perform intra-ureteric catheterisation under general anæsthesia. In spite of prolonged attempts the surgeon was unable to introduce a catheter into either ureters, owing to obstruction by the crystals. At this point Major Laird massaged over the kidneys and ureters and a flow of sludge-like urine was at once seen by the surgeon.

Before a satisfactory technique had been evolved, the treatment of such cases presented a grave and anxious problem. Every effort was made to avoid anuria—by inspecting urine, by watching water intake and by keeping patients showing signs of intolerance under close observation. Yet, as was inevitable with the large numbers treated, hæmaturia and anuria still occurred from time to time. With rigid control the incidence at my clinic has been very much reduced, and in the last 1000 patients treated for gonorrhœa with sulphapyridine 24 g. in five days, there have been only 2 instances—one a simple hæmaturia, the other going on to anuria. The latter patient had concealed his hæmaturia and had taken 1·0 g. of the drug after secretion of urine stopped. He complained of pain in the lumbar region, but there was no renal colic and vomiting was not severe. Both cases responded, within an hour, to treatment on the lines to be described. It was not necessary to give intravenous saline in either of them.

TREATMENT

In simple hæmaturia it will usually be sufficient to stop the drug and make the patient drink plenty of water. If hæmaturia is followed by anuria, the same treatment may suffice, provided enough water can be retained by mouth. The seriousness of the case largely depends on the severity of the vomiting, because of the consequent concentration of urine, and the early onset of renal colic is an unfavourable sign. Rarely anuria sets in without a preliminary hæmaturia.

If no urine has been passed in the first half-hour after the diagnosis has been established and enough water has been retained, it may be unnecessary to give a saline

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infusion. With the patient in the knee-elbow position, the ureteric openings into the bladder (three-quarters of an inch to 1¼ inches above and to the outer side of the prostate) are massaged per rectum. The ureters enter the bladder at a point one-third of the way up the seminal vesicle on the outer side, and crystals are commonly formed at this site. Massage over the kidneys and ureters is then performed, from above downwards, with the patient lying on his back; two or three minutes per side is usually sufficient. The pelvic portion of the ureter is inaccessible except where the ureter enters the bladder.

Should renal colic commence and vomiting become severe, intravenous saline will usually be required; but, once this has been started, massage of the ureteric openings becomes more difficult and it is therefore wise to make another attempt per rectum, in the knee-elbow position, before the infusion begins. If no urine is passed, intravenous-drip saline is given and after 100 c.cm. has been injected, another rectal and abdominal massage is performed. With an infusion in progress, the ureteric openings into the bladder must be massaged in the left or right lateral position, according to which arm is being infused. Success depends largely on the correct position of the patient. His head should be as near the arm as possible, the lower knee should be brought nearly up to the arm, the upper knee higher still, and, most important of all, one or two pillows should be placed below the buttocks. The patient should rotate the spine to the left if he is in the left lateral position and to the right if he is in the right lateral position. If these instructions are carried out the operator will find that usually he can reach well above the prostate, though not so easily as with the knee-elbow position. The upper renal tract can readily be massaged whilst the infusion is in progress, with the patient lying on his back.

When the fluid in the body is augmented, either by mouth or by intravenous infusion, the whole of the renal tract, which is elastic, becomes dilated. The massage displaces the obstructing crystals and allows them to be dissolved or washed away by the urine when the flow is re-established. Pressure on the pelvis of the kidney has the same effect as pressure on the bulb of a Higginson syringe. Local heat may be helpful in relieving the pain, which may become severe, and possibly in dissolving the crystals. There is no reason to withhold morphia. If this treatment should fail it would be unwise to wait longer than twelve hours before performing intra-ureteric catheterisation. (In one instance the bladder was washed out and filled with normal saline, and the ureteric openings were then massaged on a full bladder. If massage on an empty bladder fails, this method might be worth trying.) When intra-ureteric catheterisation is found necessary, and the operator finds that he can introduce a catheter on one side only, he may comfort himself with the knowledge that in certain reported cases the un-catheterised kidney has resumed its function after a short interval.[1] The general condition of the patient improves as soon as urine flows again, and the pain subsides, although it may not disappear for about 8 hours.

The small number of cases of anuria treated does not permit conclusions as to the proportion in which a good result might have been achieved without recourse to more heroic measures. It seems, however, significant that 8 cases in sequence have responded to massage, sometimes aided by saline infusion, without intra-ureteric catheterisation. All the patients were suffering from gonorrhœa, and although the course of treatment had to be cut short—the second day was the commonest time for the development of anuria—most of them did well and did not require further treatment. The liability to anuria with sulphathiazole appears to be less; although the drug is more rapidly excreted, it does not cause so much vomiting.

SUMMARY

In 8 cases of anuria following the use of sulphapyridine the flow of urine was re-established by massage over the kidneys and ureters externally, and the lower end of the ureters per rectum, supplemented where necessary by intravenous infusion of normal saline solution.

1. Laird, S. M. *Lancet*, 1941, ii, 272.

PNEUMOCOCCAL MENINGITIS

RECOVERY WITH SULPHAMETHAZINE

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SULPHAMETHAZINE has been used with success in the treatment of pneumonia and meningococcal meningitis (Macartney et al. 1942, Jennings and Patterson 1942). It therefore seemed justifiable to try it in a case of pneumococcal meningitis, especially as sulphapyridine has often failed to cure this condition and treatment may be hampered by vomiting (Cooke 1941). With sulphamethazine, moreover, high blood concentrations are maintained with less frequent doses than are required for sulphapyridine, the concentration in the cerebrospinal fluid being 50–80% that of the blood (Macartney et al. 1942).

In the previous reports on sulphamethazine, already quoted, there is no record of cyanosis, and in the case described here, it did not appear until the sixth day of treatment. The absence of renal injury was significant because such injury was a feature of the first two adult cases of pneumococcal meningitis successfully treated with sulphathiazole (Ruegsegger and Hamburger 1941, Myers et al. 1941).

Although Cooke (1941), from his analysis of 94 cases of pneumococcal meningitis treated with sulphonamides, concluded that the older age-groups have a bad prognosis, this patient recovered at 68. In a comprehensive review of pneumococcal meningitis, Ruegsegger (1942) traced only three cases of recovery after the age of 61.

A female paraphrenic, aged 68, who had been undergoing treatment for constipation in the hospital ward since Jan. 11, 1943, was noticed to be unusually drowsy on the evening of Jan. 15, and there was herpes on the upper lip. Her temperature on that day had been up to 102·4° F., but after an enema it dropped to 99·2° F. (A similar fall of temperature had occurred after an enema on Jan. 12.)

On the 16th lumbar puncture was performed which resulted in a rapid flow of turbid fluid. As by this time slight neck rigidity, mild photophobia, and a doubtful Kernig sign had developed, a provisional diagnosis of a coccal meningitis was made and treatment with sulphamethazine was started immediately, 2·0 grammes being given at 11 AM, and again at 1 PM, 5 PM, and 11 PM. During that day the temperature remained at about 99° F. The subsequent report on the cerebrospinal fluid showed that the infecting organism was a pneumococcus. On Jan. 17 she was given 2·0 g. at 5 AM and 1·0 g. at 11 AM, then 1·0 g. was given six-hourly till 5 AM on Jan. 22, when 30 g. had been taken altogether.

CSF REPORTS

Date	Cells (total)	Polymorphs (%)	Protein	Sugar	Pneumococci	
			mg. per 100 c.cm.		Smear	Culture
Jan. 16	9000	95	240	49	scanty	scanty
,, 18	350	50	160	54	neg.	scanty
,, 25	145	20	140	59	neg.	neg.
Feb. 1	74	10	100	61	neg.	neg.
,, 8	44	2	80	62	neg.	neg.
March 8	75	8	90	56	neg.	neg.
,, 18	58	2	90	58	neg.	neg.
April 19	52	6	55	59	neg.	neg.

Wassermann reaction negative. Chlorides normal.

There was no obvious change on the second day of treatment except that the temperature rose to 102·4° F. and was not lowered by an enema. On the third day the temperature, which had remained at about 101° F. during the morning, rapidly fell to normal. While this drop was taking place the patient stated that she was hungry and wanted something to eat, and from then onwards she became progressively brighter. Neck-rigidity and Kernig's sign, however, were still present and she complained of headache and pain across the shoulders.

The temperature showed a peak of 99·6° F. on the fifth day (Jan. 20) but did not rise again above 99° F. On the sixth day cyanosis developed, but this subsided next day when treatment was stopped. By Jan. 25 the clinical signs had disappeared, but the symptoms persisted for a few days longer. On March 2 she was able to walk unaided round the

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airing court and her further progress was uneventful. In view of a persistent high cell-count in the CSF, however, she was given a further course of sulphamethazine consisting of 1·5 g. t.d.s. for a week, commencing March 10, but in spite of this the pleocytosis persisted (see table).

The urine, which had shown a trace of albumin and a few granular casts on Jan. 15, was normal on the 26th. Examination of the blood on the 30th showed no evidence of agranulocytosis.

No primary focus in the patient could be traced, but pneumococcal sore throats were prevalent among the nursing staff at the time.

My thanks are due to Dr. J. D. Silverston for permission to publish this case and to Imperial Chemical (Pharmaceuticals) Ltd. for supplying the drug.

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Reviews of Books

The Practice of Refraction

(4th ed.) Sir STEWART DUKE-ELDER, MD St. And., FRCS. (Churchill. Pp. 328. 15*s*.)

THE new edition of this book, which does not differ greatly from its predecessors, contains a clear and not too lengthy description of the eye as an optical instrument, the methods of testing for errors of refraction, and the indications for their correction. Many ophthalmologists will be grateful for the chapter on spectacle frames and lenses—subjects sometimes omitted as being the province of the optician, though vital to the oculist; he will certainly be called upon to criticise the fitting of these frames, and must know how the job should be done before he can advise. The chapter on eyestrain is perhaps somewhat overdrawn. It is especially necessary at present to keep this subject in its correct perspective and to avoid burdening the public with unnecessary glasses in an attempt to relieve symptoms which are due to ordinary fatigue. The best pair of eyes may be tired at the end of a day's close work, when the catch phrase "eyestrain" springs to mind, but the same person would not be surprised to have tired legs at the end of a walk and begin to talk of "leg strain." The book ends with some useful appendices on eyesight grading and visual standards, visual requirements for the Services, and some optical tables taken from Percival.

Shock

Its Dynamics, Occurrence and Management. VIRGIL H. MOON, MD, professor of pathology, Jefferson Medical College, Philadelphia. (Kimpton. Pp. 324. 21*s*.)

THIS is not a renamed second edition of *Shock and Related Capillary Phenomena*, though it contains much of the same material in condensed form. The book is divided into two parts: the vascular dynamics of shock; and the prevention, recognition and management of shock. In the first part, Moon quotes largely from his more recent papers in support of his argument that the primary change in shock is a generalised capillary damage due to the action of some toxic substance or substances. He is above all a unionist. He sees the same mechanism at work in the "shock" (if one may use this word) sometimes accompanying such diverse conditions as burns, heat-stroke, eclampsia, icterus gravis, severe infections, and arsenical poisoning. The main findings which lead him to this conclusion are hæmoconcentration during life, and, after death, those pathological features so well known under the name "Moon's wet necropsy," the constant presence of which is not admitted by all workers. His arguments do not bring final conviction. Moon is an experienced worker, and his experimental results are undoubtedly true; the weakness of his position, as we see it, is to apply them too widely. In the second part he is on less secure ground, as a pathologist adventuring into the clinician's realm. This part contains little new, and his reports of the experiences of workers who have treated many shocked casualties in this war do not refer to the newer British work. Academically, the book is useful because it sets forth, in some detail, one school of thought; but it has little fresh information for the doctor who wants to improve his treatment of shock.

Venereal Disease in Britain

SYDNEY M. LAIRD, BSc, M D Glasg., FRFPS, DPH. (Penguin Books. Pp. 80. 9*d*.)

THE first five chapters of this little book—well and simply written for the intelligent layman—carefully explain the facts and figures of venereal disease in this country, while the later ones consist of a plea for compulsory notification and treatment along the lines practised in Scandinavian countries. Major Laird is careful to emphasise the need for public enlightenment as a preliminary to comprehensive legislation and believes that "the people of Britain could be made venereal-disease-conscious in six months by the intensive use of the public press, radio and films, if the Government made up its mind to pursue such a policy." There can now be little doubt that such in fact is the intention of the Government, and the appearance of this new *Penguin* on the bookstalls indicates that publishers have sensed a coming change in public opinion.

Ignorance and prejudice are the two great enemies of progress and though intensive education may do wonders against the former, the latter will yield only after a long hard war. Until this happens the legislator will have to walk warily. England differs in many ways from Sweden, and measures might fail in Liverpool which are successful in Stockholm. The book is ideal for discussion groups, and the more it is read and talked about the better.

Year Book of Urology, 1942

OSWALD S. LOWSLEY, MD, FACS, director of the James Buchanan Brady Foundation, New York Hospital. (Chicago: Year Book Publishers; London: H. K. Lewis. Pp. 456. 19*s*.)

THIS yearbook maintains its customary high standard. It differs from its predecessors in that most of the urological advances have to be credited to American urologists, as must necessarily be the case when work in European clinics is severely restricted. An unfamiliar feature is the list of test questions on the paper jacket, one of which for example demands: "What three roentgen signs may be considered pathognomonic of ureterocele? For the answer see page 20." On subjecting himself to this unexpected form of examination the reader is apt to find his knowledge deficient, but on turning to the appropriate pages will discover the answers, given clearly and with a minimum of padding. It is a good way of keeping urological knowledge up to date, reminiscent of the clinical rags of student days.

Tropical Nursing

(2nd ed.) A. L. GREGG, MD Dubl., DTM & H. (Cassell. Pp. 185. 6*s*.)

A NURSE in the tropics deals with a large number of conditions not commonly seen during her normal training, and she may be called upon to work in remote areas where a highly organised medical service is not available, and to undertake many procedures that at home would be carried out by junior medical officers. In peace-time special courses were available for nurses proposing to go to the tropics; but it is probable that many now in the military services have had to be sent abroad without such extra training. This little handbook should therefore have a wide appeal among the nursing profession; it gives a good account, from the standpoint of practical nursing, of the commoner and more important tropical diseases, and describes the technique of the simpler diagnostic and therapeutic procedures that the nurse in the tropics may have to carry out. There is also a chapter on personal hygiene in the tropics which will be useful to the girl about to take up her first appointment abroad. It is of convenient size, well printed, free from serious errors and well worth its modest price.

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THE LANCET

LONDON: SATURDAY, MAY 22, 1943

SULPHONAMIDES AND THE RENAL TRACT

HÆMATURIA and anuria have come to be recognised as serious complications of sulphonamide therapy and have been reported with increasing frequency following the use of sulphapyridine, sulphathiazole and sulphadiazine. The condition was well described in these columns by LAIRD [1] in 1941, and its prevention and treatment formed the subject of a later annotation.[2] The clinical events comprise three stages. In the first stage, hæmaturia is microscopic only and there is sometimes pain; in the second, the hæmaturia is gross and is usually accompanied by pain, but clears up rapidly on withdrawing the drug and giving ample fluids; in the third, despite such remedial measures, there is impairment of renal function which may lead to nitrogen retention, anuria and death. The pain is usually severe and situated in the suprapubic and lumbar regions. In the first and second stages treatment is straightforward, for withdrawal of the drug and the pushing of fluids will bring rapid improvement. Where it is impossible to administer abundant fluids by mouth because of vomiting or unconsciousness, 4·28% sodium sulphate with 5% glucose in normal saline should be given by intravenous drip. In the third stage, with anuria, early ureteric catheterisation will save life.

Hæmaturia due to chemotherapy should be diagnosed in the earlier stages in which the simple measures are uniformly successful. It results from the deposition of crystals of the acetylated compounds in the renal tract, which occurs only in relatively concentrated urines (specific gravity above 1014).[3] Macroscopic hæmaturia is thus most likely to develop in patients in whom the daily urinary output is allowed to fall below 1500 c.cm. Special vigilance is required, in this respect, in patients suffering from shock and in those being treated in a hot climate where the tendency to dehydration may be strong. Elsewhere in this issue KERR reports sulphapyridine anuria in a patient who was treated initially on board ship where the ration of drinking water normally falls far short of that required to prevent hæmaturia. Alkalisation of the urine is not a complete safeguard against crystallisation of the drug in the urinary tract and many cases have now been reported in which hæmaturia developed in patients receiving alkalis and excreting an alkaline urine. To prevent anuria by ensuring secretion of 1500 c.cm. of urine daily it is important that all patients taking full doses of sulphonamides should have an intake of at least 5 pints of fluid. For its treatment the value of early ureteric catheterisation and lavage cannot be too often emphasised. Anuria of twelve hours' duration is the signal for surgical intervention, and cystoscopy with ureteric catheterisation and lavage of the renal pelves is usually the operation of choice. In infants or in other patients for whom this proves technically impracticable, unilateral nephrostomy has been successful.[4] When anuria is present fluids must *not* be pressed without relieving the obstruction in the ureters, for they are liable to cause hydronephrosis and flooding of the peripheral circulation.[5]

On p. 648 FLYNN describes successful treatment in the early stages of anuria by massage of the kidneys and accessible parts of the ureters. He reports that massage per rectum over the ureters in their course through the bladder wall—the commonest site of obstruction—followed by external massage over the kidneys and upper ends of the ureters is a useful addition to the usual regime of fluids, morphia and atropine and heat to the loins. In 7 cases of anuria treated by this method the flow of urine has been re-established without recourse to ureteric catheterisation.

1. Laird, S. M. *Lancet*, 1941, ii, 272. 2. *Ibid*, 1941, ii, 646.
3. Lehr, E. and Antopol, W. *Science*, 1941, 94, 282.
4. De Lacy, G., Cohen, R. H. L. and Spencer, J. *Lancet*, 1943, i, 74.

DOCTORS AND THE FUTURE

Is there any need for this "comprehensive medical service"? On p. 663 a group of Bournemouth doctors question the necessity for interfering with medical practice as it exists today, and ask for evidence of its imperfections. The demand is reasonable, but surely it has already been met? Most reformers begin by explaining what they want to reform, and more or less concise statements of the inadequacy of medical services can be found in the Dawson report (1920), in the report of the Royal Commission on National Health Insurance (1926), in the report of PEP on *The British Health Services* (1937), in the interim reports of the BMA Medical Planning Commission (1942) and of Medical Planning Research (1942), and in the Labour Party's *National Service for Health* which has just appeared. In the United States such works as *The Cost of Medical Care* (1932) and *American Medicine* (1937) have analysed the objections to private practice as a means of transmitting to every man, woman and child the full benefits of medical science. Obviously the individual doctor no longer suffices by himself; and a large variety of other agencies—from hospitals downwards—have been established to supplement his work. But the practitioner who has no status in hospitals or public services is not always in a position to make the best use of available facilities, and his preventive work is hindered if many of his patients must think twice about fees before they consult him. In a prosperous town like Bournemouth, with its well-coördinated services, there may indeed seem to be little need for change in the present system; but elsewhere a larger proportion of the population is "medically indigent." In the poorer areas the need to apply medical knowledge more effectively seems more urgent.

These shortcomings of medicine are not the fault of doctors: they arise from altered conditions. But the medical calling has altered too. The ancient and honourable craft of medicine long ago became a profession, but "the profession has lived on into an epoch in which it has had to make its terms with, to employ pecuniary devices from, and to respond to the incentives of, business." [6] Few would deny that the business element in medicine has made headway, and many besides idealists would like to see the profit motive taken out of it. Further, the idea of a comprehensive medical service in which

5. Laird, *Ibid*, 1942, ii, 527.
6. Hamilton, W. H., Cost of Medical Care, Chicago, 1933.

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there are no economic barriers between the patient and his efficient treatment must be attractive to all. Nevertheless there would be wide opposition to reforms in these directions if they involved lay control of the detail of medical work, and few would agree that the profession—to save itself from commerce—should be reduced to a state or municipal service and nothing more. The neat and convenient solution proposed by the Labour Party in its *National Service for Health* is unacceptable because it treats the doctor purely as a technician and makes no attempt to preserve the traditions of a learned profession. These traditions are useful because they give every entrant to medicine, in greater or less degree, a sense of duty to the past and also to the future: and in practice the professional pride of medicine is more potent than the feeling of privilege and duty inspired by municipal employment. The holidays and regular hours of the Labour Party scheme are no substitute for the spirit of the profession. In escaping commercialism and building a comprehensive medical service we must somehow ensure that the doctors of the future shall be capable and cultivated men and women working at the top of their powers for the sake of their work—doing their duty with more in mind than obedience to rules. For each of them we must preserve the sense of personal responsibility.

The resolution from a Manchester meeting which we print on p. 659 reflects a fear that Labour's simple programme may be realised, and that the relations between profession and public may be changed overnight. This risk we believe to be negligible so long as the profession remains constructive in its policies. Medical planning, as Lord DAWSON puts it, requires "collectivism for its fabric and individualism for human relationships." We must insist on the latter, but equally we must accept the former. We may ask for progress by instalments—for experiment and multiformity. But we cannot, at this stage, deny the need to coördinate and complete. It is reassuring to know, from the statement on p. 667, that discussions with the Government continue.

TRENCH MOUTH

IN this war we have had no large-scale outbreaks of ulcerative gingivostomatitis (Vincent's disease) comparable with those in 1914–18, when the syndrome was christened "trench mouth"; but there has nevertheless been ample evidence [1 2 4 5 7] that trench mouth is still with us in one form or another. On another page STUHL and KENT describe their separate experiences of it and both lay stress on the value of supplementing local hygiene of the gums with vitamin C. In direct contrast to their findings, KING[1] in this country and SCHWARTZMAN and GROSSMAN[2] in the United States obtained no significant improvement in ulcerative gingivitis when vitamin C was given but found nicotinic acid beneficial. Evaluation of these conflicting results is impossible until more is known of the many ætiological agencies which appear to be concerned. A further complication is the absence of established standards of a normal gum and hence of the earlier deviations from health towards disease. In a discussion at the section of odontology of the Royal Society of Medicine on April 19 ulcerative gingivostomatitis was defined as an acute ulcerative condition of the gums or other tissues of the mouth, accompanied by characteristic fœtor, regional adenitis, hæmorrhages, and general symptoms of lassitude and malaise.[2] This would include only the later phases of the disease, and takes no account of the typical pre-ulcerative hyperæmia of the interdental gum papillæ or third molar "flaps," which if left untreated is apt to flare up into true ulceration or remain as a subacute potential danger. Moreover, among 100 unselected cases of ulceration of the gums, KING noted that little or no fœtor was present in 57 and little or no adenitis in 69 cases. The significance of proliferation of fusiform bacilli and spirochætes in ulcerative gum lesions is uncertain. Contrary to KENT'S opinion, there is a mass of evidence to suggest that a diagnosis of trench mouth based on smear-findings should be accepted with considerable reserve if not completely discounted. This evidence includes not only the presence of large numbers of fusospirochætal organisms in various non-ulcerative gingival lesions, and the almost constant failure to induce trench mouth in healthy mouths, but also the frequent absence of cellular defensive reactions in an established case and the fact that in many biopsy sections the organisms are found lying in the superficial necrotic debris and not in the deeper tissue. These considerations all point to the fusospirochætal flora being mere secondary invaders of tissues already damaged by other means. The crux of the problem would then be the manner in which the gingival soil is prepared for ulceration.

Trauma of the gums undoubtedly plays an important part in the ulcerative syndrome. The inflammation set up by such injury may itself be the result of a variety of agencies, both constitutional and local. Among the constitutional factors are any conditions which predispose to gum hyperæmia, inflammation and hyperplasia, such as mouth-breathing, catarrhal infections, fevers and certain vitamin deficiencies. Local factors include tartar deposits, food debris about the teeth, cervical and interstitial caries and fillings, incomplete eruption or malposition of the teeth, loosening of the teeth from chronic parodontal disease or accidents, and ill-fitting crowns, bridges and partial dentures. The onset of trench mouth is prone to be preceded or accompanied by infections such as the common cold. "It is surely no mere coincidence," says KING, "that in this country the number of trench mouth cases reaches its peak in the autumn and winter months, when the common infections (colds, &c.) are rife, and falls to a minimum in the late spring and summer when tissue resistance is usually highest." In his view other general debilitating diseases may play a similar rôle, but the common cold is the principal depressor of tissue resistance under British climatic conditions. The reported successes with nicotinic acid or ascorbic acid are probably due to stimulation of tissue resistance. Both of these vitamins are closely concerned in tissue respiration, so that any debilitating diseases or even heavy physical exertion may, by increasing the rate at which these food factors are used up, result in a relative deficiency even though the intake would be adequate under normal circumstances. No definite

1. King, J. D. *Lancet*, 1940, ii, 32; *Brit. dent. J.* 1943, 74, 113, 141, 169.
2. Schwartzman, J. and Grossman, L. *Arch. Pediat.* 1941, 58, 515.

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conclusions are yet possible as to the respective efficiency of ascorbic acid and nicotinic acid as adjuncts to local treatment. One group of patients may require vitamin C, a second nicotinamide, and a third both vitamins. Some confusion might be avoided if investigators stated more precisely the type of lesions treated and the criteria adopted for assessing recovery.

The viruses associated with herpes have lately been implicated in ulcerative gingivostomatitis.[3] The cases of "primary herpetic stomatitis" described by SCOTT and STEIGMAN in children, however, differ in certain clinical signs and symptoms from typical trench mouth. Thus the tongue was often involved, which is rare in trench mouth, and regional adenitis remained for as long as four to five weeks after the mouth was healed, whereas in trench mouth if adenitis is present it disappears rapidly under treatment. No causal association could be found with fusospirochætosis. The cases of stomatitis described by WALTON, GRAHAM and LANSDOWN,[4] and by HENRY[5] form another apparently separate ulcerative affection of the mouth cavity in which fusiform bacilli and spirochætes take no part; here the bacteriological picture includes certain streptococci. Here, too, the signs and symptoms differ considerably from those of trench mouth. Ulceration of the gums is not a prominent feature and there is severe toxæmia, together with bullæ and crusting of the lips, conjunctivitis, blepharitis, and skin lesions. The condition responds dramatically to blood-transfusion, but sulphanilamide and sulphapyridine seem to be of no benefit.

Whether trench mouth is contagious has been much debated. The balance of evidence, excluding the merely circumstantial, suggests that the disease is not transmissible from man to man unless local or general tissue resistance is sufficiently depressed.[1 6] On this basis alone it would be rash to condemn the segregation of patients and their feeding utensils, especially when large groups of people are living communally. Some believe, however, that a more reliable method for the prevention of outbreaks would be the prophylactic gum treatment of all those in contact with an established case, together with a close inquiry into their nutritional status. Much detailed investigation is still required before we can even hope to classify ulcerations of the mouth with any degree of accuracy; it is still less feasible to attempt to lay down hard and fast rules for their treatment and prevention.

3. Dodd, K., Boddington, J. and Johnston, L. *Amer. J. Dis. Child.* 1939, 58, 907. McNair Scott, T. F. and Steigman, A. J. *J. Amer. med. Ass.* 1941, 117, 999. Black, W. C. *J. Pediat.* 1942, 20, 145.
4. Walton, C. H. A., Graham, H. M. and Lansdown, L. *Lancet*, 1941, ii, 214.
5. Henry, T. C. *Brit. med. J.* 1942, ii, 273.
6. Rosebury, T. in Gordon's Dental Science and Dental Art, Philadelphia, 1938, p. 415. *J. Amer. dent. Ass.* 1939, 26, 1798. *Ibid*, 1942, 29, 823.
7. Ungley, C. C. and Horton, J. S. F. *Lancet*, 1943, i, 397.

THE next session of the GENERAL MEDICAL COUNCIL will open on Tuesday, May 24, at 2 PM, when Mr. H. L. EASON, the president, will take the chair.

SIR ARTHUR NEWSHOLME, who died at his home in Worthing last Monday at the age of 86, was principal medical officer of the Local Government Board from 1908 to 1919 and a leader in public health in this country for 40 years.

Annotations

WARMING THE WOUNDED

A YEAR ago we drew attention[1] to some work by Blalock and Mason and its bearing on the traditional methods of treating shock. They found that "shocked" animals died sooner if they were warmed, whereas cooling postponed though it did not ultimately prevent their death. Blalock and Mason thought that the ill effects of warming were due to the transfer of blood from the internal organs into the skin. Recently further attention has been drawn to this interesting and very practical problem.[2 3] It has been suggested that injury may bring into play a cooling mechanism, so that an actual or threatened diminution of the blood-volume may be compensated by a reduction in the metabolic demands of the body tissues. Where the circulation of a limb has been gravely impaired, artificial cooling of the part has been found to reduce the needs of the tissues for blood, and also to bring bacterial processes to a standstill, with consequent benefit to the patient. It is hinted that during some phases of shock recovery may be assisted by active cooling.[2]

More recent evidence does not support this idea of a cooling mechanism. Wakim and Gatch[4] found that a variety of animals shocked by the method of intestinal stripping, and all showing a progressive hæmoconcentration, died more rapidly when placed on bags cooled to 5° C. Animals kept at body temperature fared best, while those heated by raising the temperature of the bags to 50° C. died more quickly. This work supports the opinion formed during the last war that cold favours shock. Further argument against the existence of any cooling mechanism is provided by Cuthbertson.[5] He found that within 24–48 hours of an injury, which might be comparatively trivial and unassociated with shock, there is a detectable rise in the body metabolism. This rise is probably proportional to the amount of soft-tissue injury. At this stage there is inevitably a demand for an adequate circulation, and one of the objects of treatment must be to replace lost fluid before this demand arises. One can then summarise by saying that the body temperature of shocked patients should be kept as near normal as possible. Artificial aids to warmth are required only when the temperature of the environment makes them necessary.

In conclusion attention should be drawn to a recent paper dealing with the properties of the heat cradle commonly used in hospital for applying heat to patients.[6] Normally such cradles have bare lamps and polished reflectors; consequently they feel very hot, and in fact they may inflict a serious burn on an unconscious patient. If, however, the reflector is blackened all danger of burning is obviated and the cradle can be left in place without discomfort to the patient. Such a specially prepared cradle has been found capable of raising the body temperature of a normal person several degrees within an hour or two. This powerful weapon may have its uses in some other field of therapy, but it certainly has no part to play in the early treatment of shock.

PLANTAR WARTS

SOME of the schools of Buckinghamshire have lately had an epidemic of plantar warts. This is no new thing in the district, for in his 1938 report Dr. A. W. Forrest described an exhaustive investigation by himself and Mr. John O'Brian, senior chiropodist, on these plantar warts which for some years had been causing anxiety

1. *Lancet*, 1942, i, 598.
2. *J. Amer. med. Ass.* 1943, 121, 432.
3. *Army med. Dept. Bull.* 1942, No. 17.
4. Wakim, K. G. and Gatch, W. D. *J. Amer. med. Ass.* 1943, 121, 903.
5. Cuthbertson, D. P. *Lancet*, 1942, i, 433.
6. Brown, G. M., Evans, D. S. and Mendelssohn, K. *Brit. med. J.* 1943, i, 66.

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to the school medical department. Little was heard about plantar warts until 1934, when the school medical officer of London reported a small outbreak, and it was not until Sir Arthur MacNalty gave them a chapter in his *Health of the School Child* for 1937 that any great attention was paid to them. They may have been common in the past, for most cases only come to light on inspection and medical inspection of school-children used not to include inspection of the feet. People with corns do not usually go to doctors for relief, so these peculiar warts might well escape the doctor. But since 1937 school medical officers have been on the look out for them and numerous outbreaks, some of considerable extent, have been reported. The distribution of plantar warts points to infection as a certainty. The infective agent is a virus, but whether it is the same virus as that which causes multiple warts in other parts is disputed. Infection has been alleged to be spread by bare-footed dancing (floors), by communal plimsols, by swimming-baths, and by shower-baths into a small foot basin. All these are possible, but none covers the whole ground. The foot basin is the most promising suspect, though in most cases no means of spread can be proved. Predisposing causes and possible means of entry are wearing plimsols, rubber-soled shoes, wellingtons, splinters from floors, &c., abrasions and sundry lesions of the sole; but it is doubtful if any of these are of much importance. The disease is about twice as common in girls as in boys, is most frequent about the ages of 10–12 and rare in infants, but may occur at any age. Treatment by local applications is unsatisfactory, but the warts can be destroyed by X rays. If the plantar warts are caused by the same virus as the multiple warts not uncommon in children, the natural course of the disease would be automatic disappearance from the development of immunity. The warts are papillomata and the question whether they are likely to become cancerous has been raised, since one view of cancer genesis is that it involves a virus. But warts in children mainly affect the hands and soles of the feet, and how often is cancer seen in these sites? There seems to be no evidence of a plantar wart becoming cancerous, but an early squamous epithelioma might be mistaken for a benign wart. Where special attention has been given to the discovery of plantar warts in school-children incidences averaging about 6% of girls and 3% of boys are found, but they occur definitely in local topical epidemics. These do not correspond with increased incidence of warts on the hands, which suggests that the viruses of the two are not the same. Until there is satisfactory evidence of the means of spread, no measures for suppression can rest on a sound basis and none has been shown to have value, except periodical foot inspection and treatment of the cases discovered.

BIRTHPLACE OF ANTIBODIES

Of the several possible sites of antibody production in the animal body the reticulo-endothelial cells have been most favoured because it seems plausible that the cells which ingest and destroy foreign antigens should also be concerned with the formation of antibody. This view is supported by experiments which have shown that, after the intravenous injection of antigens, specific antibodies can be detected in the spleen, liver and bone-marrow earlier than in the blood-serum. Experiments in which the reticulo-endothelial cells have been immobilised by such agents as india ink have also lent some weight to this view. More convincing evidence was produced by Topley,[1] who transferred the minced spleens of recently immunised rabbits into the peritoneal cavity of normal rabbits and found that the donor cells produced a detectable amount of antibody in the recipient's body. One might expect that the part played by the reticulo-endothelial cells could be more clearly demonstrated by tissue-culture experiments. Beard and Rous,[2] however, working with pure Kupffer-cell cultures, could not demonstrate that these cells produced any antibody in vitro, and they suggest that the physiological isolation inherent in such experiments may be misleading. There is, therefore, only circumstantial evidence that the reticulo-endothelial cells are concerned in the production of antibodies, and it is well to remember that even in passively immunised animals immune serum tends to be found in greatest concentration in such organs as the liver and spleen. There is even less reliable evidence for the local production of antibody by the histiocytic cells at the site of local infection. Again it must be remembered that antibodies concentrate at sites of infection, and Burnet[3] was quite unable to demonstrate any local antibody production in the skin.

A third possibility, originally suggested by Pfeiffer in 1898, is that antibodies are produced by the lymphatic nodes which drain an area of infection. This view has the support of McMaster and Hudack,[4] who showed that if two different antigens were injected, one into each ear of mice, the corresponding antibody appeared first in the lymph-node of the same side. Experiments by Burnet and Lush[3] using influenza and herpes virus as antigens also suggest that in certain circumstances antibodies can be found in the lymph-nodes one or two days before significant amounts are demonstrable in the blood-serum. The most recent work is that of Ehrich and Harris,[5] who were able to collect 0·2–0·6 c.cm. of lymph from the vessels of the popliteal lymph-node in rabbits, which is the only node draining the hind foot. These workers injected typhoid vaccines into the hind foot of rabbits and at various intervals after injection collected the lymph from the afferent and efferent vessels of the popliteal gland. In all experiments it was found that the titre of antibody was higher in the efferent lymph; in some cases the concentration was 100 times that found in the lymph of the afferent vessels. In adequate control experiments such findings were never obtained. Antibodies could be detected in the regional nodes 2–4 days after the injection of antigen and they reached maximum concentration by the 6th day. It is noted, however, that while the titres in the serum at first lagged slightly behind those in the efferent lymph of the injected foot they reached a higher level within a day or two. In addition to watching the serological reactions Ehrich and Harris made histological studies of the regional nodes at intervals after injection. They found that the presence of antibody in the efferent vessels was preceded by a sharp rise in the output of lymphocytes in the efferent lymph, while sections of the nodes showed a well-developed lymphatic hyperplasia. They suggest that these findings point to the lymphocyte as a possible site of antibody formation but the evidence on this point is not yet convincing. It seems likely that antibodies can be formed within the lymph-nodes, but there is still not enough evidence to incriminate any particular type of cell.

OUTSIDE THE TEXTBOOKS

Dr. C. E. Lakin described his oration to the Medical Society of London on May 9 as a string of beads, only held together by the idea expressed in his title. He gave some gruesome examples from the 150 recorded deaths from spontaneous combustion, beginning with Dickens's fictional but horribly realistic account of the end of Mr. Krook in *Bleak House*. According to Hooper's *Lexicon Medicum* of 1848 the victims of this mysterious catastrophe have mostly been aged alcoholic women; some burning substance has come in contact with their body or been in the room at the time, or there has been reason to attribute combustion to an electrical cause;

1. Topley, W. W. C. *J. Path. Bact.* 1930, **33** 339.

2. Beard, J. W. and Rous, P. *J. exp. Med.* 1938, **67**, 883.
3. Burnet, F. M. The Production of Antibodies, London, 1941.
4. McMaster, P. D. and Hudack, S. S. *J. exp. Med.* 1935, **61**, 783.
5. Ehrich, W. E. and Harris, T. N. *Ibid*, 1942, **76**, 335.

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the extremities have usually escaped and often the clothes as well; and the products of combustion have consisted of greasy and fœtid ashes whose quantity has been small compared with the animal matter decomposed. The phenomenon is distinct from ordinary combustion, says Hooper, for this flame speedily reduces the body to ashes, whereas incineration of a human body is normally tedious and difficult; there is no evidence that the ignition ever arises in the body itself; the condition seems to be one of preternatural combustibility, in some way connected with the long use of alcohol—but does it exist at all? Dr. Lakin had found what seems to be the earliest medical bulletin on record—a false one delivered from the top windows of a palace in Rome by the wife of Ancus, one of the early kings, and intended to conceal his assassination while her adopted son seized the throne. Then there was Sir StClair Thomson's unpublished case of a woman with chronic cerebrospinal rhinorrhœa due to gummatous infiltration near the cribriform plate, in which the copious discharge could be explained by the presence of a papillomatous mass growing from the choroid plexus. Dr. Lakin told of a doctor who had found a trick posture which would reduce his recurrent intestinal volvulus, and of an alleged recurrent hernia into a peritoneal pouch which was relieved by cold compresses after a hot bath; he had other tales to show that the source of abdominal distension may be outside the intestinal tract—a retroperitoneal hæmorrhage, an ascending infection of the vas deferens or even severe oxaluria—if it reflexly stimulates the sympathetic nerve-supply of the intestines. He ended with a plea for the retention of freedom within our profession, and quoted a saying of Salvador de Madariaga: "A democracy that goes to war, if beaten loses its liberty at the hands of its adversary, if victorious it loses its liberty at its own hands."

NEW LESSONS IN FIRST-AID

THIS war has revolutionised the doctrines and practice of first-aid. The methods of the St. John and St. Andrew Associations and the Red Cross can now be regarded as classic, but while their principles remain unaltered it has been found necessary to modify the details of practice profoundly. This was brought out by Dr. H. N. Garrus on May 11, in his lecture to the Institute of Civil Defence on maintaining the standards of organised first-aid. The training of first-aid personnel, he said, falls into three stages—the personal basic training in technique, team training, and finally combined exercises of large-scale civil-defence work. Organised first-aid is concerned essentially with team work, and great advances have been made both in the methods of teaching and the actual carrying out of the procedures. Many people thought it was extremely difficult if not impossible to train the manual worker, who is often recruited for rescue work, in first-aid technique, but Dr. Garrus has shown that this is erroneous. Such men are not accustomed to think in book terms, but rather from the experience of their eyes and the use of their hands. This clearly pointed the way to the best method of instruction—demonstration. Not nearly enough use is made of the demonstrative method. The bulk of training hours are too often taken up with lectures in which an odd practical point may be shown, but purely as an incidental. Three-quarters of the time could well be occupied by the demonstrations accompanied by a running comment from the lecturer. This point was also lately brought out by Prof. H. A. Harris in a course for Home Guard medical officers, when he said that classes wanted to be *shown*. A class will have a far better idea of what a bone is like if a fresh shin-bone from the butcher's is handed round; this could be made the focus for many lessons such as the effect of infection on bone. Five principles must be brought home to the first-aid team, and the first is the need for saving time. Time can often be saved by improvisation, but that does not mean hasty first-aid. A clove-hitch round the wrist with the ends tied round the neck for a broken clavicle will save a minute, and is adequate treatment for a walking case close to hospital. While this saving of time is in itself small, it becomes significant when many cases have to be treated. The saving of manpower is again important, and it is possible for one man to treat a fractured tibia by binding the legs together and supporting with sandbags, when two men are needed to apply the classical method adequately. The third principle of saving material may loom large when many casualties must be treated at the same time; improvisation will then enable a fractured femur to be immobilised with three bandages if the subsequent carriage is short and easy. The fourth point is that full training in classical first-aid is the only sound basis for the practice of improvisation methods. The man who has had only four hours' training may think he knows all the answers but this view will not be shared by his patient. Finally, deployment of the first-aid facilities at an incident must be carefully studied, and the team leader must add to his present responsibility of deciding priorities of sorting, treatment and despatch the responsibility of deciding how much first-aid is necessary. As bombs become heavier and more efficient so the amount of debris at an incident is likely to increase, and so more rescue work will be necessary. When we are faced with the sum of less personnel plus more work, the only answer to equate with this is better work.

MENIÈRE'S DISEASE

IN 1861 Menière showed that lesions of the inner ear may be responsible for paroxysmal attacks of vertigo, nausea and vomiting, deafness and tinnitus,[1] and since that time his name has been associated with such attacks. It has long been appreciated that the immediate origin of the symptoms is a lack of balance between the impulses reaching the central nervous system from the two labyrinths, due to intermittent failure of one of them. A similar though more prolonged and possibly more severe group of symptoms arises when the inner ear or its central connexions are suddenly overwhelmed by infection, injury or some vascular disaster: if the loss of function caused by these or other intracranial conditions is gradual, the symptoms will be correspondingly mild. It is, however, to the fairly large group of cases in which no abnormality is evident that the title Menière's syndrome has been applied. Hallpike and Cairns[2] in 1938 were able to demonstrate in two such cases an obstructive distension of the endolymphatic system of the labyrinth, and this has since been confirmed by Hallpike and Wright[3] and by Rollin.[4] Their work has established on an anatomical basis the existence of a disease process, sui generis, of the labyrinth. Both custom and tradition suggest Menière's disease as a title for this condition.

More recently the clinical aspects of this disorder have been examined in considerable detail at the National Hospital, Queen Square,[5] and on May 7 Mr. Cawthorne and Mr. Hallpike discussed their observations at a meeting of the section of otology of the Royal Society of Medicine. In the first place they have developed the technique of the caloric tests, so as to facilitate recognition of vestibular changes at an earlier stage. There is hope, too, that the tests may be interpreted on a qualitative basis, yielding information as to the particular organ in the labyrinth, canal or utricular otolith, which is involved. In 50 cases of Menière's disease vestibular function has been studied by means of these tests applied

1. Menière, P. *Gaz. méd. Fr.* 1861, **16**, 597.
2. Hallpike, C. S. and Cairns, H. *J. Laryng.* 1938, **53**, 625.
3. Hallpike, C. S. and Wright, A. J. *Proc. R. Soc. Med.* 1939, **32**, 16.
4. Rollin, H. *Hals-, Nas.-u. Ohrenarzt*, 1940, **23**, 39.
5. Cawthorne, T. E., Fitzgerald, G. and Hallpike, C. S. *Brain*, 1942, **65**, 115.

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according to the new technique, and no less than 46 exhibited abnormal reactions. These abnormalities appear capable of classification into isolated lesions of the external canal, isolated lesions of the utricle and combinations of the two.

This condition of obstructive distension of the endolymphatic system explains the finding of Dederding [6] and Furstenberg et al.[7] that measures designed to prevent the retention of fluid within the body would alleviate symptoms. Cawthorne and Fawcett [8] noted in a small series of cases that the converse was also true. Wright [9] believes that an active focus of sepsis can aggravate the condition, and he has seen many patients improve after the removal of such foci, but it is not certain how prominent a part focal sepsis plays in this disease. An allergic basis for the symptoms has often been suggested and eustachian insufficiency still has its adherents. It is possible that any of these conditions may precipitate an attack, but in view of the pathological findings it must be affirmed that the essential lesion is a deficiency in the excretion or absorption of endolymph leading to a distension of the whole endolymphatic system.

Cases in which the attacks cannot be checked by one or more of the conservative measures of treatment can get relief by cutting out the impulses from the affected labyrinth. This can be done by draining the endolymph system—a harmless procedure—or by injecting alcohol into it, either operation being relatively simple. Intracranial section of the vestibular division of the 8th nerve will have the same effect without destroying the remains of the hearing in the affected ear. This is a more formidable operation than is indicated when it is thought desirable to preserve hearing on the diseased side. It sometimes happens, however, that the hearing in the diseased ear is so distorted, especially for loud sounds, that its destruction is an advantage because it enables the patient to listen in comfort to sounds that he could not previously tolerate. Whatever forms of treatment are employed, it is well to remember that the disease has a tendency to spontaneous remission, and that the recurring paroxysms of vertigo and associated symptoms place a heavy burden on the nervous system and often evoke additional symptoms of nervous strain. Once the true nature of the disease has been appreciated, however, it is now possible to offer enough relief from attacks to enable the large majority of sufferers to maintain or return to a normal life.

MEDICINAL HERB COLLECTION

EARLY in the war the Minister of Health appointed an interdepartmental Vegetable Drugs Committee, under the chairmanship of Sir Weldon Dalrymple-Champneys, with some outside experts, to investigate home production of vegetable drugs in short supply and particularly the utilisation of wild plants. For administrative reasons the responsibility for the committee was later transferred to the Minister of Supply, though the personnel remained unaltered. A survey of national resources showed that enough material was available to justify collection and so county herb committees were organised. The basis of these was national organisations such as the National Federation of Women's Institutes, the Women's Voluntary Services, the Boy Scouts and the Girl Guides, with local pharmacists, botany teachers and other specialists to advise. Soon a large army of voluntary collectors was at work, and though the first year's work began rather late 10 tons of dried herbs were gathered and the central committee decided to go on with the scheme a second year. In 1942 the enthusiasm of the county herb committees, far from being dulled, increased, and their organisation improved all round, with the provision of drying sheds, more sacks, better transport facilities and closer liaison with the trade. Unfortunately, the weather did not fit in so well with the collecting periods; the incidence of foot-and-mouth disease prevented access to much useful land; and greater demands on part-time labour for potato lifting and the like also hampered the work. Nevertheless 192 tons of dry herbs were collected, which fully justified the effort. The work was helped by a monthly bulletin issued by the main committee, pamphlets, lectures by competent botanists and others, press notices and broadcasts. This year all these are again being fully used and the committee feel confident of a record harvest in 1943. In 1941, 220 tons of rose hips were collected, and last year 341 tons. A National Rose Hip Products Association was set up to handle the crop and nearly a million bottles of delicious syrup containing 200 mg. ascorbic acid per 100 ml. were produced in 1942. This part of the scheme, too, will be continued this year. Another venture which started last year was the collection of horse chestnuts, which were used as a source of glucose, and at the same time provide saponin and cattle fodder as by-products. The Vegetable Drugs Committee early interested itself in the possibility of making agar from British seaweeds; here they were helped by the Scottish Marine Biological Station at Millport. Long and painstaking experiment showed that the scheme was possible; extensive ecological survey, and manufacture research by a pharmaceutical house, showed it was practical. Continued improvements were made in the product and now bacteriologists have passed the manufacturer's samples of British agar as satisfactory. Prof. Lily Newton, honorary algologist to the committee, will supervise collection, and a target of 200 tons dry weight of the special seaweed has been set for collection this year. In her lecture at the Royal Society of Arts on May 12, Miss E. M. Delf, DSc, explained that agar can well be extracted from many kinds of red algæ, several of which already grow on the coasts of the British Isles, and she was hopeful that research will lead to successful cultivation of desirable types. Here then is a small but important contribution to the war effort, and perhaps the beginnings of a post-war industry.

A CONNOISSEUR OF DISEASE

WHEN one of our peripatetic correspondents wrote of "a disease unknown to Professor Parkes-Weber" he was of course indulging in wishful thinking: there is no such malady. An interest which covers antenatal and postnatal developmental anomalies, respiratory disorders, diseases of the blood-forming organs and blood-vessels, dermatology, endocrine disturbances, medical problems connected with life insurance, and climatology and balneology leaves few loopholes. And since it is true that if you only know medicine you don't know that, Dr. Frederick Parkes-Weber's mind overflows into other channels: he is an antiquarian of standing who has presented a fine collection of coins to the British Museum and whose wide knowledge of books and pictures has found one expression in *Aspects of Death in Art and Epigram*, published first in 1910 and reaching a fourth edition in 1922. His presence graces meetings of most sections of the Royal Society of Medicine, where he joins actively in discussions, especially those of the clinical section, and the sections of the history of medicine and for the study of disease in children; and his knowledge and versatility are equally valued at the Medical Society of London. His eightieth birthday, and the fiftieth anniversary of his election to the German Hospital, which coincided on May 8, were announced in our issue of that date. It is permissible, perhaps, to congratulate Dr. Parkes-Weber on his birthday and the hospital on Dr. Parkes-Weber.

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Special Articles

THE STRANGE CASE OF MR. HUXLEY'S EYES

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Mr. Aldous Huxley's book, *The Art of Seeing*,[1] has disturbed public confidence in orthodox methods of treating disorders of vision. His argument therefore requires an answer.

"Ever since ophthalmology became a science," he writes, "its practitioners have paid attention exclusively to eyes, not at all to the mind which makes use of the eyes to see with."

"I have been treated by men of the highest eminence in their profession, but not once did they so much as faintly hint that there might be a mental side to vision . . . They gave me spectacles and they let me go . . . Whether I used my mind and my bespectacled eyes well or badly . . . were to them matters of perfect indifference."

The reader might be excused if he concluded that Mr. Huxley was suffering from some psychological defect of vision. Such was not the fact however.

"At sixteen," he writes, "I had a violent attack of keratitis punctata . . . My subsequent inability to see was mainly due to opacities in the corneæ of both eyes, but there was also hyperopia and astigmatism."

"At first I was advised by my doctors to do my reading with the aid of a powerful hand magnifying glass, but later I was promoted to spectacles . . . With these I was able to read tolerably well—provided always that the pupil of the better eye was kept dilated with atropine . . . A measure of strain and fatigue was always present."

"Things went on in this way for twenty-five years, when, in spite of greatly strengthened glasses, the task of reading had become increasingly difficult and fatiguing."

But, just at this time, Mr. Huxley happened to hear of Dr. Bates's methods of visual re-education. Within two months he was reading without glasses, with neither strain nor fatigue, and the corneal opacities which had remained unchanged for upwards of 25 years were beginning to clear up.

THREE CHARGES AGAINST THE PROFESSION

From these and similar statements we may formulate Mr. Huxley's case against the medical profession as follows:—

(1) They treat the eye, but ignore the mind, and the patient to which both belong.

(2) They prescribe glasses which neutralise symptoms only. Eyes fitted with these tend to grow progressively weaker, and to require stronger glasses for their correction.

(3) They regard as unorthodox the methods of visual re-education such as those of Dr. Bates. Had they prescribed these methods at the start, Mr. Huxley's eyes might well have been cured in a few months.

Let us, then, take each of these accusations in turn, to see how the profession stands.

(1) All medical students, before they enter the wards, learn the position and structure of the visual parts of the brain, together with the courses of the optic nerves and tracts which connect these with the retinæ. During their clinical studies they repeatedly see patients in the general parts of the hospital being sent to the eye department for diagnosis or treatment. Later on, when they themselves are attending as students in the eye department, they see patients being sent to the medical, the surgical, the neurological and the other special departments. These frequent events can hardly fail to emphasise in their mind the importance of the connexion between vision and every other part of the patient's make-up. Further, any English textbook of ophthalmology should quickly convince Mr. Huxley; for in it he will find, on nearly every page, references to the other organs, or to the patient as a whole.

(2) With regard to spectacles; there is no doubt that these do neutralise symptoms and moreover experience shows that, in nearly every case, the more complete the neutralisation, the better for the ultimate welfare of the patient. That spectacles aggravate symptoms is entirely untrue. There are eye diseases where the symptoms get worse; but this is in spite of, not because of the spectacles which the patient is wearing.

(3) Mr. Huxley is quite wrong in thinking that doctors regard visual re-education as unorthodox. Such methods have been used for years for the treatment of, for example, squints and amblyopia. That Dr. Bates's precise methods are not more used is probably due to the recognition that his methods have no special advantages, and in some ways may not be so good as those proposed by others. The profession did not advise Mr. Huxley to use such methods, presumably because they appeared to be inappropriate to Mr. Huxley's case. When Mr. Huxley states that in two months he could read without glasses, and that the corneal opacities were smaller, I accept his statement. What I am quite unable to accept is his assurance that visual re-education brought about these dramatic changes.

All the criticisms brought by Mr. Huxley against the medical profession have thus been met, and I now propose to advance a hypothesis to explain the various phases of Mr. Huxley's illness which he so aptly describes.

THE DISABILITY

Until the age of sixteen Mr. Huxley appears to have had normal, or nearly normal vision; the hypermetropia of childhood was easily dealt with by an efficient mechanism of accommodation. At sixteen, the attack of keratitis punctata left corneal opacities, hypermetropia and astigmatism. Corneal irregularities produced by the disease may have caused the two latter, but to my mind a much more plausible explanation is that both were due to over-corrected spherical aberration.

Tscherning[2] refers to the observations of Thomas Young, Volkmann and Brudzewski, who found that the normal human eye often exhibits spherical aberration in the peripheral zones of the pupil. In some cases these zones are myopic, and in others hypermetropic. On theoretical grounds we should expect this spherical aberration to be accompanied by some degree of astigmatism of the second order. Eyes in which these peripheral defects are present usually have excellent visual acuity under normal conditions of illumination, because the peripheral zones of the pupil are cut off by the iris. Only when the iris dilates, for example, in feeble illumination, do these peripheral zones transmit light and produce their deleterious effects; but, as retinal acuity is low in feeble illumination, the fall in definition of the image does little or no harm.

Very different is the condition of an eye in which an opacity of the cornea or lens cuts off these central rays of good definition. Under these conditions the iris dilates, in order to admit light to the retina, and in so doing uncovers the peripheral zones of the pupil, causing a serious fall in visual acuity.

Two further factors adversely affect the situation—the Stiles-Crawford effect and veiling glare. It will be remembered that the former is the retinal direction phenomenon, which restricts the subjective intensity of the light which has passed through the periphery of the pupil. The latter is due to the light which is scattered haphazard over the retina through diffusion by the optical media of the eye. In normal eyes this veiling glare is small in amount; on the other hand, in pathological eyes it may have a very serious effect on vision. This is due to the fact that the light which is broadcast over the retina reduces the differences in intensity of light and shade, and thus renders the appreciating functions of the retina far more difficult. In eyes where the peripheral rays alone form focused images this veiling glare becomes still more harmful, because the peripheral rays are themselves, as we have seen above, reduced in intensity by the Stiles-Crawford effect.

Now that is the condition that I picture Mr. Huxley's eyes were in, when, following keratitis punctata, he was left with two corneal opacities occupying the centres of the pupils. Small wonder that the visual acuity in the better eye was reduced, so that using spectacles and with the pupil dilated with atropine, he could just see the 70-foot line on Snellen's type at 10 feet.

1. London: Chatto and Windus. 1943.

2. Tscherning, M. H. E. Physiologic Optics. Philadelphia. 1904.

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That this veiling glare was a factor of considerable difficulty to him is clearly shown by two improvements which he describes in his book—the use of an electric spotlight for reading, and the use of a black screen, with an aperture in it, which could be held in the hand and moved to and fro over the page. The spotlight produces the maximum light on the page, and the minimum light on the corneal opacity; the black screen reduces the intensity of light reflected from the page on to the corneal opacity; the two in combination would be expected on theoretical grounds greatly to diminish the amount of veiling glare.

I have gone into the question of glare rather thoroughly because I think that this factor was likely to have had effects on Mr. Huxley's vision which were more serious than those of the hypermetropia and astigmatism which he mentions. It was probably serious in its effects, not only on vision, but also on diagnosis. It would make difficult, if not impossible, the use of the excellent mirror test (retinoscopy), used by ophthalmologists, and would force them to depend exclusively on subjective tests. These are quite good when visual acuity is satisfactory and the patient is a good witness, but correspondingly vague when visual acuity is a small fraction of the normal.

I have no means of ascertaining what amount of hypermetropia or astigmatism Mr. Huxley had, but I think it doubtful that the hypermetropia was large in amount. For if it had been large it seems to me unlikely that he would have been allowed by his doctors to use atropine to dilate his pupil, for fear of precipitating an attack of glaucoma. As to the astigmatism it seems to me unlikely that it exceeded 2 dioptres.

THE DETERIORATION

I have now reconstructed, so far as I am able, what may be called the first phase of Mr. Huxley's visual defect. The second phase now presents its problems—namely, to explain the steady deterioration during the 25 years which followed the acute condition.

"In spite of greatly strengthened glasses," he writes, "I found the task of reading increasingly difficult and fatiguing. There could be no doubt of it; my capacity to see was steadily and quite rapidly failing."

What could have caused matters to approach a climax like this after all those years? Of a number of possible explanations, two only seem to me to meet the case: (1) that the climax was due to a decrease in pupil diameter, and (2) that it was due to a reduction in the opacity of the cornea, or to both these factors in conjunction.

It is quite usual for the pupil diameter to suffer a decrease as age advances. If this had occurred in Mr. Huxley's case, it would have had the effect of reducing the intensity of the rays, which, in conjunction with the spectacles that he wore, were producing focused rays on the retina; whereas it would have had no such effect on the glare-producing rays from the corneal opacity.

With regard to this opacity, the ideal treatment would have been to remove it altogether if possible; the next best would have been to have rendered it completely opaque to all light—e.g., by the injection of a suitable aniline dye—for this would at once have cut off the glare-producing rays. The worst thing that could happen would be for the opacity to become more transparent to light rays, for this would have the effect of increasing the glare.

Now, we must suppose, that that is precisely what did happen to Mr. Huxley's eyes: by degrees, year by year, the opaque material began to soften and disintegrate, allowing more scattered rays to fall on the retina. This alone may have made vision increasingly difficult, leading to asthenopia, and possibly setting up a vicious circle. If at the same time the pupil diameter was decreasing, then one could readily imagine that sooner or later a climax would be reached.

THE CURE

We must now turn to the dramatic third phase of Mr. Huxley's illness, about which he writes: "In two months I was reading without spectacles."

Many explanations might be tentatively offered for this sudden and miraculous improvement—e.g., that a sudden sclerosis of the crystalline lens had neutralised the hypermetropia. Two arguments can be advanced against this explanation: (1) that the hypermetropia was only a small part of the disability, and (2) that it is hardly credible that this sclerosis should have occurred at precisely the same time that Mr. Huxley began to visually re-educate himself.

An explanation must therefore be sought elsewhere. To my mind it is to be found in Mr. Huxley's own book. "Moreover," he writes, "there were definite signs that the opacity of the cornea, which had remained unchanged for upwards of twenty-five years, was beginning to clear up."

Suppose the diameter of the opacity was suddenly reduced. Then certain beneficial effects would follow: first, there would be a decrease in the intensity of the rays which were producing glare; secondly, there would be an increase in the intensity of the rays which were producing focused images; and, thirdly, there would be a constriction of the pupil, which would cut off the peripheral rays which were causing the hypermetropia and the astigmatism.

The problem that still has to be solved is how the decrease in the diameter of the opacity could have been brought about. I have already stated that I find it impossible to credit that this was the result of visual re-education as such, but it is quite likely that it was due to the vigorous eye movements which form a part of some of the exercises. These eye movements would be expected to cause relative motion between the anterior eye structures and the aqueous humour. Gentle lavage of the posterior surface of the cornea would take place, and the opaque mass, softened by the lapse of time, would be progressively eroded, starting at its edges and working towards its centre. The little particles as they became separated would be slowly swept out of the anterior chamber via the spaces of Fontana and the canals of Schlemm into the scleral veins.

The above hypothesis may require modification as fresh facts come to light. But until it is definitely disproved Mr. Huxley cannot claim that beyond all doubt his cure was due to Dr. Bates's methods. Another explanation is evidently possible; and this is also true of the other cases of defective vision which he claims were cured by visual re-education.

MEDICINE AND THE LAW

The Patient's Demand for Radiograms

A SPECIALIST in radiology often becomes aware that patients are anxious to possess the radiograms of which their bodies are the subject. They have a general impression that, if they pay to have their picture taken by a photographer, they are entitled to expect copies of the result; that is what they have paid for. If they are not misled by the imperfect analogy of commercial photography, some patients like to keep the radiograms as souvenirs, while others may wish to carry about these records from one consultant to another in the hope perhaps of obtaining an opinion which will really satisfy them. The legal problem of property in radiograms[1] may not have been as finally settled in this country as in the United States, but at least, as a recent case in the Darlington county court has shown, the patient cannot plead the non-delivery to him of the radiogram as an excuse for not paying the radiologist's fees.

In the Darlington case (Fothergill *v.* Robson) a general practitioner had arranged that Dr. William Crichton Fothergill should make an X-ray film of a boy's cervical spine. This was done; Dr. Fothergill sent next day the films with his report to the general practitioner; the findings, as it happened, were negative. The radiologist sent in his account to Mr. Robson, the boy's father, at intervals. It was ignored. After a year he wrote a letter drawing attention to the overdue account. Mr. Robson then replied that Dr. Fothergill had undertaken to provide him with an X-ray photograph and a written report and had failed to perform his contract. Dr. Fothergill answered that in accordance with professional custom he had sent the films and the report to the defendant's doctor who would doubtless be willing to pass them on to him. Not receiving any reply, Dr. Fothergill was obliged to take proceedings, the defendant

1. *Lancet*, 1942, i, 118; also 1932, i, 56.

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reiterating in his defence the previous argument. The judge awarded the plaintiff the two guineas he had claimed; Dr. Fothergill, he said, had done the work and was obviously entitled to the fee. The judge, however, expressed a certain sympathy with the defendant who knew that the photographs had been taken and the reports made, but was not able himself to see them. The newspaper account of the proceedings nowhere states that Mr. Robson ever applied to his medical attendant for the films and the report or that the judge had any comment to offer upon the fact, not unknown to the medical profession, that, when fees remain long unpaid, a demand for them sometimes elicits complaints of which nothing has previously been heard.

Claim for Dentures

A dentist's appeal from a county-court decision has lately explained an important point of law. He had made some dentures and claimed 12 guineas for his work; the defendant answered that this was a sale of goods and, under section 14 of the Sale of Goods Act, there must be implied a condition that the dentures were reasonably fit for the purpose intended; the buyer relying upon the seller's skill and judgment. The patient's mouth, it was said, was in no way unusual and the dentures did not fit. The county-court judge accepted the defendant's contention and his decision has been upheld on appeal. The point is that, if a dentist extracts a tooth, he is obliged only to take such reasonable care and to show such skill as might be expected from a qualified practitioner. But, if he contracts to provide dentures, he must, by reason of the relationship between the parties and the purpose for which the contract is made, be deemed to undertake that, given reasonable coöperation on the patient's part, he will achieve reasonable success in his work and produce dentures which will fit well and can be used for the purpose of eating and talking in the usual way. If the case is a difficult one and it is doubtful whether, with the reasonable degree of skill which a professional man may be expected to command, he will succeed, the dentist must make an express contract limiting his liability. The plaintiff in the case under discussion had pleaded that, if this was not a contract for the sale of goods, then it was a contract for work done and materials supplied for a particular purpose—in which event a similar term must be implied. The Court of Appeal says it is a matter of legal indifference whether the contract was for the sale of goods or for work done and materials supplied. Either way the dentist was undertaking to achieve reasonable success.

A GROUP OPINION

A MEETING of Manchester and Salford practitioners was held at the Manchester University Union on May 9, to consider the following resolutions:—

1. That this meeting has no confidence in the committee nominated by the council of the British Medical Association "to discuss matters with the Minister of Health."
2. That no state medical service can be accepted which does not provide adequate compensation for loss of practice and capital, the preservation of the doctor's professional status, and remuneration commensurate with the services he is required to render.
3. That the control of the service in all professional matters shall be invested in the hands of medical practitioners of recognised standing and experience in actual medical practice.

After considerable discussion resolution 1 was lost by 40 to 42 votes; a number refrained from voting.

Resolutions 2 and 3 were carried with a single dissentient, and then the meeting considered the following resolution:

That this representative meeting of members of the medical profession is strongly opposed to any scheme which places entire control of the health services of the country in the hands of local authorities: and calls for the formation of a Royal Commission to consider the matter in all its aspects.

This was carried unanimously and with acclamation.

The Reich Minister for Industry has given doctors the power to withdraw temporarily or altogether the tobacco ration cards from patients who continue to smoke against the doctor's orders (*Klin. Wschr.* 1943, **22**, 244).

In England Now

A Running Commentary by Peripatetic Correspondents

THE Town Hall was packed to the roof for the "Wings for Victory" variety concert. I had certain qualms about the children draped round the walls to which they mysteriously adhered apparently in defiance of the law of gravity. Despite nervousness on their account and my own, I enjoyed the three turns preceding mine—the quartette from the church choir, looking as foolish as only elderly men with their heads together can look, but singing like angels: Mrs. Stockleigh's rich mezzo, rather wasted I thought (but not so the rest of the audience) on those hackneyed ballads, and Mr. Dart's adroit conjuring which ended with a triumphant display of the flags of the United Nations clearly fabricated from thin air. Nobody could have wished for a more sympathetic audience, my introductory "Good evening" being unexpectedly returned with a shrill "Good evening, doctor" from all the impaled children, and my mildest sally being received with shouts of laughter and applause. The quiz I conducted (married v. single) revealed some startling ignorances; one bright young thing thought that "England expects . . ." was originally spoken by Mr. Churchill, and nobody could see why a coin dated 2000 BC might be phoney. Much fun was had with tongue-twisters and recitations with assumed colds in the head or impediments of speech. The married won, 9–6.

* * *

To a hayseed such as I a visit to London is little short of a great adventure. The railway company, in return for my illuminating talks to its employees on first-aid, granted me a free first-class pass both ways. It may be a surprise to some—though not perhaps to many—that I did not have a carriage to myself. Among my fellow travellers was a subaltern of marines who told me that he had weighed 14 lb. at birth and now weighs 14 times as much (work it out for yourself). There was also an obvious prep. school headmaster with a harassed (and, I'm sure, gainlessly occupied) spouse and two small boys, a rather pretty girl who seemed bored by a neurotic-looking young man (adorer or brother, I couldn't say which) who smoked too many cigarettes. There was an elderly man with a twinkling eye who read the *Christian Herald*, a lean man with a boil on his right cheek who never lifted his eyes from his novel, a US subaltern with sandy hair, and a couple of tired-looking RAF officers. No sustenance was offered except by the headmaster's wife, who had over-estimated the potential sausage-roll intake of her offspring by the narrowest possible margin.

Both ducks and tulips in St. James' Park seem to be getting through the war very satisfactorily. Not far away a pair of mallard have set up house in one corner of the flooded cellar of a demolished building—a nidifying spectacle. I put them up as I went by. They flighted straight down the road, swung left and coming in again would have offered a nice right and left. What fun, by the way, one could have (police permitting) with a shotgun in London these days. A great variety of sporting shots could be taken at pigeons who look fit enough even if they have got what used to be called psittacosis in my young days but is now called something else—just to make medicine more difficult. Until it was pointed out to me I had never noticed that a pelican's wings are exactly like those in conventional representations of angels.

A little pardonable jiggery-pokery enabled me to visit the private view at Burlington House. I also saw the exhibition of war paintings at the National Gallery. Among many other things I admired the bold sweeps of Mr. Paul Nash's brush no less than the detailed and patient work of Sir Muirhead Bone and reached the wistful conclusion that one must be both young and blue-eyed before one can hope to be chosen to sit for a vigorous portrait by Mr. Eric Kennington.

A visit to Congreve's *Love for Love* at the Phœnix Theatre convinced me that, though this thoroughly witty and bawdy restoration comedy might doubtless have been done differently, it could hardly have been done better. With a cast composed entirely of stars of the first magnitude this is not to be wondered at. They tell me that when Mr. Gielgud feigns madness in

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the second act he had the courage to burlesque his own interpretation of Hamlet, which to my regret I never saw. The air-raid in the last act of *Heartbreak House* is surely quite the best kind of air-raid, the noise of the aero-engines coming through to us is lovely music and the bomb selecting for destruction just those antisocial members of the community who never would be missed. I revelled in Mr. Robert Morley's devastating rudenesses in *The Man who came to Dinner* but rubbed my hands with satisfaction when his unhappy nurse, stigmatised on, I am sure, insufficient evidence as a sex-starved cobra, got a bit of her own back. I saw also a film of *Random Harvest*, in which an amnesic and perplexed Mr. Colman was restored to health and serenity by the patient efforts of Miss Garson. The lady in the next seat drove me and her presumably medical companion nearly balmy by inquiring every ten minutes whether the freakish behaviour of Mr. Colman's memory was possible. Who cares? The subsequent cartoon featured my favourite actor, Mr. Donald Duck, who is in a class by himself.

* * *

Hard are the ways of the practising democrat. I went the other day to the local municipal hospital to operate on a mastoid. Now it is a part of the charm of such work to meet young men and women from the schools of the empire, and on this occasion a boy from Dublin was to give the anæsthetic and a girl from Glasgow to assist. I had met neither before. When we had finished it was the time for the evening draught, and I wished to invite my two young helpers to join me. But no! Keen as I am on women in the professions, I cannot stand a pint at the not-quite-local to the lady house-officer. And so the male midder student from the near-by medical school who had been looking on joined us instead. It is not often that I visit this hostelry, so I was surprised while standing at the bar to be addressed by a stranger who said "You were in here last time I was." "Then," said I, "it must have been a long time since." "Yes," says he, "it's over four months and fifteen of those days were spent on the open sea on a raft" "Well! you must have one with me now you are back when you've drunk that one." "Oh! that's for the missis," he said. And so we had to join the two. The sailor started to tell us of his adventures; but as these included the names of many ports and the routes that convoys take between them, we had, with tact, to silence him. And then his missis took up the tale. "Well!" she says, "however bad your job is, it's not as bad as mine." And so to get us away from the sea, I asked her what that was. It appeared that she was a cleaner at the hospital from which we had just come, and she started to dilate upon the enormities of her job. This was awkward. However democratic one may try to be, it does not do for the visiting otologist to hob-nob with the cleaner that waits upon the ward-maids. So I finished my pint and we went.

* * *

"We are now witnessing," wrote Pearsall Smith in 1912, "the struggle of the Genius of language with the popular but somewhat indigestible word cinematograph." The language has done it by ejection. The word is not heard today. We go to the pictures or the flicks. But what can the Genius do with the octosyllabic names of modern science? Teachers have long given up trying to prevent students saying streps and staphs, and polys vie with polymorphs. But now we subdivide the streptococci, and perhaps the paper shortage will come to the assistance of the genius of language by compelling us to write hæmostreps (57) for the 57th of Griffith's types of Lancefield group A of the hæmolytic streptococci. Certainly we should speak of hæmostreps. It is the same with the new drugs. The ageing brain cannot remember all their names; the young one should not attempt to do so for many will soon disappear. Generically we should speak about the Sulphs. Often we need to discuss whether we should use them at all before deciding which one to employ, and for "The question is whether we should exhibit chemotherapy" we may well ask "Shall we put him on a Sulph?"

* * *

Two things may spoil a sulphonamide cure: timidity at the start and not knowing when to stop. As Spenser put it: "*Be bolde, be bolde,* and every where *Be bolde— Be not too Bolde.*"

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

To Mr. Attlee as deputy prime minister fell the enviable duty of announcing the victorious end of the Tunisian operations to a cheerful and cheering House of Commons. Field-Marshal Smuts has called this the beginning of the end and it may well be. The Government and the House now turn to still greater objectives for which preparations are already being carried out behind the scenes. The Prime Minister is in Washington, military and government conferences are being held in the Near East and there are consultations in the Pacific, for the new phase of this global war. The House goes on with its business, but realises that there is more urgency about postwar organisation than before.

The debate on the Town and Country Planning (Interim Development) Bill was notable for a grasp of the big issues involved. The Barlow report on the location of industry, the Scott report on the utilisation of land in the countryside, the Uthwatt report on compensation and betterment give clear indication of the great scale of the planning necessary. The bill gives the Minister some of the powers that he will need and it is hoped that in the year when the war ends the transition from war to peace will not be marked by the maladjustments of 1918–20 followed by the economic blizzard of 1930–31.

Preparations are also being made on the food front. Mr. Mabane, the parliamentary secretary of the Ministry of Food, had a good account to give of our supplies. We are the only country in Europe with an unrationed loaf and we are probably the only country in Europe adequately preparing for 1944 and 1945. Mr. Mabane warned the House that at the end of hostilities we shall still face a shortage of food. To meet that shortage we must maintain the present world-wide organisation operating through the Anglo-American Combined Food Board with which are associated directly or indirectly all the Dominions (except Canada and Eire), India, all the colonies and all the United Nations. This board operates in London through the London Food Committee. "The purpose of that committee is to prepare a programme of the essential needs of all the countries with which it is concerned, to relate those needs to the supplies available, and, finally to present an agreed programme to the Combined Food Board for approval and submission to their governments." This organisation prevents competitive buying of foods in short supply and for this reason alone it will be necessary after the war, Mr. Mabane thought perhaps for "longer than we think."

The grand strategy of food in war-time has its lessons for the period of disturbance that will inevitably follow the collapse of the Axis. But after the war the field of operations will be greater, including China and the Far East, and epidemics of typhus, malaria and other infections may threaten us. A great deal of the work in the immediate post-armistice period will be that of epidemic control, food relief and other "ambulance" activities under medical control. The medical profession, and in particular those who have been trained during the war by their service in the forces, will have a great task to perform.

FROM THE PRESS GALLERY

Mr. MABANE, parliamentary secretary to the Ministry of Food, in presenting estimates in the House of Commons on May 13 said that if home agriculture produced as large a proportion of our food this year as last the national larder would remain well stocked during the next twelve months. The Minister's desire, differing slightly from Julius Cæsar's, was: "Let me have men about me who are fit." Scientists now properly related food and fitness; we were able to produce and import not merely food but food values. This, however, was a long-term business. The main concern of the Ministry today was not with what people would eat tomorrow, but with what they would eat in 1944 and 1945. The strategy of food was not a domestic affair; it concerned all the United Nations. The aim of the Government

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had been to secure a common food strategy so as to avoid competitive buying during the war, and they looked forward to the maintenance of machinery for ascertaining the food needs of the peoples of the world after the war, for producing supplies to meet those needs, and for their proper allocation. Stabilisation had kept food prices steady, and in the average home today 95% of the expenditure on food went on foodstuffs subject to some form of price control. During the last two years food prices had fallen from 23% above pre-war to 20%. In the spring of 1918 the equivalent rise in food prices was 108%. During the year to March 31, 1942, subsidies to maintain level prices for staple foodstuffs amounted to £145,000,000. Successful attempts had been made to secure to the public an even flow of such intractable commodities as fresh fruit and vegetables. The national milk scheme and the development of the milk-in-schools scheme had increased the consumption of liquid milk far above the peace-time level. So far as children and expectant mothers were concerned, the Minister was determined to supply whatever they needed, not only for an adequate but for a full diet. The raw material of the race was too valuable to put at risk.

UNSAFE MILK

In debate members of all parties praised the work of the ministry. A number, however, expressed anxiety on the purity of milk supplies.

Major YORK complained of the fact that consumers could not change over from non-tuberculin-tested milk to TT milk, ostensibly because of the official rationalisation scheme, under which retail milk rounds were "frozen" to a retailer. The drive for "quality" milk, which could have been made universal in less than 10 years, would have a terrific setback.—Mr. WILFRID ROBERTS stated that the testing of cattle had greatly improved, and, looking forward to peace-time conditions, it would be much less difficult now to follow the example of the United States and clear up herds in a really wholesale way. This should be done whether pasteurisation was established or not.—Mr. DAVID ADAMS contended that if our milk-supplies produced disease in children, Mr. Mabane's statement that we were protecting the raw material of the race was refuted. In Newcastle, for example, despite all efforts by the health committee and the city council, the public still received a good deal of unsound milk, and it was not surprising that, in the North of England particularly, tuberculosis was increasing among children. If properly carried out, pasteurisation would ensure a safe milk supply.

Mr. TREE thought there was not the slightest use trying to improve the health of the nation by asking people to drink more milk unless the quality and cleanliness of the milk supplied could be guaranteed. A determined effort should be made to eliminate disease from herds. Pasteurisation should be left to the local authorities to decide.—Mr. SNADDEN said that 90% of all the milk supplied in schools in Scotland was TT.—Sir ERNEST GRAHAM-LITTLE said that the 500 cases of undulant fever reported last year were a mere fraction of those which occurred through drinking infected milk. Diphtheria, scarlet fever, paratyphoid, typhoid, septic mastitis and summer diarrhœa of children were also milk-borne. Unless present defects in production and distribution of milk could be remedied, pasteurisation ought to be compulsory.

Mr. MABANE replying to the debate said that TT milk had always been bulked because it sold at a higher price and the demand was not adequate to enable all TT milk to be sold as such. The bulking of TT milk was not due to the scheme for rationalisation of delivery. But the Ministry of Food desired to do all that they could to encourage the demand for TT milk. There was plenty of TT milk to meet the demand in general.

WHEAT GERM

Sir ERNEST GRAHAM-LITTLE said that for 2½ years only 70–75% of the grain imported into this country had been used for human food. As a consequence 700,000 tons of shipping a year was needlessly used. It ought to be laid down that no food that was any use should be diverted to any other purpose. The real core of this question was that a high degree of extraction conflicted with the interests of the milling industry; removal of the germ, the more nutritious part of the grain, was a very profitable transaction, 90% of the extracted germ being supplied to proprietary articles. Sir Ernest made a final appeal to the Ministry of Food to consider raising the extraction percentage from wheat. An experiment at the Lister Institute showed that at least 92% extraction would be possible and advantageous. With certain improved processes it might even be possible to raise the extraction to 95%.

QUESTION TIME

Food-supplies for Greece

Mr. DINGLE FOOT, parliamentary secretary to the Ministry of Economic Warfare, replying to a question stated: food supplies which have reached Greece during the last three months in pursuance of the relief scheme comprise 28,703 tons of wheat, 8561 tons of pulse and 1096 tons of condensed milk. Further shipments which have left Canada but which have not yet arrived at Greek ports include approximately 32,000 tons of wheat, 6000 tons of pulse and 600 tons of condensed milk. I have not yet been informed whether these cargoes include vitamin tablets, though we have agreed to their inclusion. Recent reports have shown a considerable improvement in the state of nutrition in Greece, as compared with a year ago, especially in Athens. But, in the absence of definite information regarding many areas, I should hesitate to say that this improvement is equally marked throughout the country.

Mr. RHYS DAVIES: In view of the grave concern in this country about the starving peoples of Europe, is it not possible for the Government to change their policy as the people who are suffering belong to nations which are very friendly to us?—Mr. FOOT: I think it does no service to the countries concerned to make out, as is done in many quarters, that there is any analogy between conditions which existed in Greece when the relief scheme was started and those which prevail now in Western and Northern Europe.—Mr. T. E. HARVEY: Is not a considerable portion of those supplies purchased by the Greek Red Cross or the Greek government?—Mr. FOOT: To the best of my recollection, condensed milk is purchased with funds supplied by Greek sympathisers on the other side of the Atlantic, but the wheat is a free gift of the Canadian government.

Regulation 33B

Dr. E. SUMMERSKILL asked the Minister of Health whether he could now say how many persons, men and women, had been informed against under Regulation 33B; how many had refused treatment and subsequently been imprisoned; and whether the informers were compelled to complete their own treatment.—Mr. E. BROWN replied: Information now received from all but a very few authorities in England and Wales shows that 36 men and 475 women have been reported to medical officers of health as alleged sources of venereal infection, of whom 1 man and 27 women have been the subject of more than one report, which is necessary before Regulation 33B can operate. Of these 28 persons 2 women have refused treatment, 1 expressly, and 1 by default, and have been prosecuted and imprisoned. No civilian voluntarily undergoing treatment for venereal disease is subject to compulsion to complete it.—Dr. SUMMERSKILL: Is the Minister satisfied that this regulation has made a substantial contribution to reducing the incidence of venereal disease? Is he aware that, as we anticipated, this regulation is operating unfavourably against women?—Mr. BROWN: I do not agree with that at all. It is quite clear to me from the reports I have received that the regulation is assisting local authorities in their voluntary work in this matter to a marked degree.—Dr. SUMMERSKILL: In view of the fact that only 36 men have been informed against, can the Minister say that this is a marked reduction?—Mr. BROWN: The hon. lady is interpreting the regulation in a sense different from that in which the House received it. It is not the intention of the House to use compulsion for compulsion's sake, but in order to secure the desired end of an improvement in the position.

Supply of TT Milk

Mr. W. MABANE, replying to questions, said that consumers may purchase whatever type of milk the supplier with whom they are registered provides; but if he does not provide TT milk they are not permitted to transfer their registrations to another dairyman in order to obtain TT milk. Efforts are

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being made to encourage and to assist dairymen to provide TT milk for customers who require it. We are doing all we can, he added, to see that as little TT milk as possible is bulked and that as much as possible is sold as TT.

Tuberculosis

Mr. JAMES GRIFFITHS asked the Minister of Health the number of cases of tuberculosis notified during the past year; if he would give separate figures for Wales, the comparable figures for 1938 and 1941, and indicate whether any particular age-group showed an increase.—Mr. E. BROWN replied: The numbers of cases of tuberculosis notified in England and Wales together, and in Wales alone, in 1938, 1941 and 1942, and the percentage increases or decreases in age-groups, are as follows:

TUBERCULOSIS: NUMBER OF CASES NOTIFIED

Year	England and Wales			Wales		
	Pulmonary	Non-pulmonary	Total	Pulmonary	Non-pulmonary	Total
1938	43,205	14,888	58,093	3096	1129	4225
1941	46,256	13,720	59,976	3286	1107	4393
1942	46,734	13,998	60,732	3262	1025	4287

NOTIFICATIONS IN AGE-GROUPS: ENGLAND AND WALES

Year	0–	1–	5–	10–	15–	20–	25–	35–	45–	55–	65–
1938	439	2852	4434	3543	6823	7715	12,417	8022	5997	4092	1759
1941	452	2921	3553	2918	7132	8197	13,240	8932	6301	4378	1952
1942	372	2783	3729	3032	7129	9133	12,944	9179	6160	4336	1935
Percentage increase or decrease in 1942 compared with:											
1938	−15	− 2	−16	−14	+4	+18	+4	+14	+3	+6	+10
1941	−18	− 5	+ 5	+ 4	..	+11	− 2	+ 3	−2	−1	− 1
WALES											
1938	20	208	254	293	581	631	903	535	406	266	128
1941	18	205	259	253	645	684	1,006	625	357	237	104
1942	19	186	248	206	589	706	950	629	355	289	110
Percentage increase or decrease in 1942 compared with:											
1938	− 5	−10	− 2	−30	+ 1	+12	+ 5	+18	−12	+ 9	−14
1941	+ 6	− 9	− 4	−18	− 9	+ 3	− 5	+ 1	..	+22	+ 6

Miners' Medical Service

The mines medical officers appointed recently are as follows: Deputy chief mines medical officer: Dr. T. E. Howell. Regional mines medical officers: Dr. W. C. Sharp, Dr. D. G. Robinson, Dr. J. T. Watkins, Dr. A. Roberts, Dr. T. H. Jenkins, Dr. J. B. Adamson. Two posts of regional mines medical officer remain to be filled. (Major G. LLOYD GEORGE replying to Mr. T. E. GROVES.)

Rehabilitation of Colonial Troops

Colonel O. STANLEY informed Mr. A. CREECH-JONES that an African rehabilitation centre had been set up in Kenya for the treatment of Africans belonging to any of the East African territories who had been discharged from the military forces on account of injuries sustained during their service. The provision of similar facilities was being considered for West Africa. In Malta special consideration was being given to the problem of persons disabled, whether by enemy action, accident or disease. He had no detailed information about other parts of the Colonial Empire.

Eye Injuries to British Troops

Sir J. GRIGG, replying to a question, stated that 0·4% of the awards made by the Minister of Pensions to British troops are to those who have lost one eye and 0·16% to those who have lost two. The actual figures are 222 and 89 respectively.

Detained Soldiers and Medical Examination

A soldier sent to a detention barracks is medically examined before he leaves his unit and again on admission to the barracks. (Sir JAMES GRIGG replying to Sir JOCELYN LUCAS.)

Ex-Service Men and NHI

Major C. YORK asked the Minister of Health whether he was aware of the unfairness caused to discharged ex-Service men who were unable to obtain sickness benefit for 26 weeks after discharge if the cause of sickness arises out of the disability for which a pension was being paid; and whether he would take steps to remedy this hardship.—Mr. BROWN: The rates of contribution payable under the NHI acts are based on the expectation of incapacity under normal conditions, and do not cover the risk of incapacity due to war service. Therefore, I am unable to propose any amendment of the specific provision of the statute whereby a man discharged from the forces becomes temporarily disentitled to sickness benefit. The 26 weeks, however, run from the beginning of the week in which the man was injured or was removed from duty and accordingly a substantial part of that period will ordinarily have expired before the date of discharge. Major YORK: When a man is in the Services does not the state pay his contributions? If that is so, why should there be this discrimination when he leaves the Services?—Mr. BROWN: There is no unfair discrimination. The issue is whether he has been subject to the normal conditions on which the scheme is based.

Purchase Tax on Deaf-aid Batteries

Lieut.-Colonel Sir IAN FRASER asked the Chancellor of the Exchequer, whether he had been able to give further consideration to the question of removing purchase tax from the batteries required for the operation of deaf-aids.—Sir KINGSLEY WOOD informed Sir Ian Fraser that certain high-tension batteries specially designed for use with hearing-aids were now exempt from purchase tax.

HOW MANY IS A FEW?

R. A. J. Asher's plea for less jargon [1] has stirred many readers; but misunderstanding may spring not only from the use of rare or cumbrous words but from the different meanings we may attach to words in common use. To illustrate this P. C. Ackerman [2] gave percentage values to the meaning of common descriptions of quantity, such as "few," "most" and "very many," and asked how much they differ from estimates in the minds of others. We have carried out the same test on five people and their values are compared with his in the accompanying table. Estimates in this series fall widest of Ackerman's mark in the values given to "many" and "very many." On seeing the results each of the five contributors was confident that his assessment was the right one, and that the others just didn't know the common shades of meaning attaching to these words.

—	Ackerman	A	B	C	D	E
	%	%	%	%	%	%
Very few	1– 2	1– 5	0–15	1– 5	5	2– 5
Few	3– 5	5–10	15–30	5–20	12½	5–10
Many	10–25	60 +	30–45	40–80	70	60–70
Very many	30–40	80 +	45–60	80–90	80	80–90
About half	45–55	45–55	40–60	40–60	47–52	45–55
Most	80–95	90 +	60–85	75–95	80	90 about
Nearly all	98–99	98 +	85–100	90–99 (inc.)	90 +	98 about

The experiment seems to show how little we have so far developed speech as an instrument of precision in conveying facts: but this does not necessarily mean it is a clumsy instrument for conveying ideas. Part of the richness of language lies in the multiple associations attaching to single words; Gray would have told us less, not more, if "the ploughman homeward plods his weary way" had implied a man of standard physique, employed in an exactly defined occupation, taking steps of known length when a correction had been made for fatigue. In fact when we want to convey concepts, definitions not only may, but must have some play. If we wish to convey precise facts we are about a different business: we are stating percepts, and must narrow our definitions accordingly.

1. *Lancet*, 1943, i, 213. 2. *Science*, 1942, 96, 560.

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Letters to the Editor

DOCTORS AND THE FUTURE

SIR,—We have been unable to find any concise statement of the evidence on which the agitation for the drastic and immediate changes in the conditions of medical practice is based. The agitation suggests a general feeling that something is radically wrong with our present methods, and that patients do not get proper and efficient treatment.

Is such a feeling really widespread and, if so, how has it arisen? If it is justified by facts it is apparent that a serious effort must be made to remedy the proved defects, bearing in mind that it takes some time to assess the value of any new form of treatment. If it is of the nature of a panacea envisaged by idealists it deserves respect and, possibly, consideration. If it is merely a nostrum exploited by political hucksters it might justly excite resentment.

The production and publication of evidence in a form that could be readily digested by busy doctors would be of incalculable value not only to them and to the younger men serving with the Forces—who after all are those most affected by the proposed changes—but to those, less actively engaged in professional work, who have time to decide the future of medicine.

A. BASIL ROOKE C. E. P. MARKBY
THOMAS ROBSON J. W. NANKIVELL
J. H. BENTLEY HUMPHREY MARRINER
D. D. MALPAS C. HEYGATE VERNON.

Royal Victoria and West Hants Hospital, Bournemouth.

RESPONSIBILITY IN HOSPITALS

SIR,—I think that your leader of April 3 gave a timely warning. A realisation of present defects in the administration of the municipal hospitals is most essential for their further progress. A criticism of such shortcomings is no reflection on the excellent work done by the medical staff, but a suggestion of how their efforts might be aided, and their burdens lightened.

Dr. Horace Joules in his letter of April 17 appeared to evade most of the points raised in your leader. His illustration of the four beds of a famous gynæcologist may have other applications. From the patient's point of view the care and attention received by one of four may be preferable to that received by one of a hundred cases. Dr. Joules does not suggest that these were the only clinical activities of this celebrity.

His reference to 14,402 beds in a single municipal service is a formidable figure; but he does not state the number of medical officers available. From the last annual report under normal conditions (1938), the bed capacity of the five general hospitals is given as 4439. The total full-time staff was 77. Of these about 54 would be engaged purely in ward work, a figure of approximately 82 patients each exclusive of a small consultant staff who acted largely on a sessional basis. This reveals a certain degree of understaffing even in these excellent hospitals.

The Middlesex County Medical Society deserves the greatest credit for its excellent presentation of clinical material. Dr. Joules, however, does not state the cause of its inception. I am told that it was to stimulate a free and open clinical discussion and criticism of cases presented which had not been practicable in the restriction of any individual municipal hospital. An additional stipulation being that the chairman was not to be a medical superintendent for the first two years of the life of the society. This may have contributed largely to its initial success.

Dr. W. A. Ramsay in his letter of April 17 states that medical superintendents have played no minor part in the process of uplift of the status of the municipal hospital. This statement would be much more convincing if it came from other members of the senior staff. Unfortunately these are often the hostages of the municipal system. With dependants they hesitate to protest when criticism would jeopardise their position, possibilities of promotion, and hopes of superannuation.

Some examples of superintendent authoritarianism are set out below:

1. The discharge of the cases of senior and junior colleagues from hospital without their knowledge or consent.

2. The removal of medical and surgical cases from a senior colleague's wards and the performance of operative or medical procedures without his consent.

3. The removal of a colleague's cases of general peritonitis from the Fowler position without his knowledge or consent.

4. The alteration of a senior colleague's ward treatment without consultation.

5. The alteration, cancellation or substitution of theatre operation lists without a colleague's consent.

6. The direction as to signature of statements by a colleague of malingering, or of mental incapacity, on the part of a patient.

7. Irregularity as to the allocation of fees from the Coroner's court.

8. The summary dismissal of junior colleagues and locum tenents without a fair hearing of their case.

With regard to the medical officers' living conditions:

1. They were not allowed to spend a night or a weekend away from the hospital even when off duty, without the personal consent of the medical superintendent.

2. Similar approval was necessary even for permission to exchange living rooms with a colleague.

3. These simple requests were frequently met with flat refusal or only grudgingly conceded.

These are only a few instances of situations that have arisen. Dr. Ramsay will find it difficult to imagine that they are in the interests of the patient, the medical man or the public.

Until relatively recently, the municipal hospital was a poor-law institution, housing a number of chronic patients. On the staff the medical officer might be the only literate person capable of coping with difficulties which arose. These institutions have since become larger general hospitals with many acute cases and a much larger staff. Yet in their rise the medical superintendent has remained and his position is now anomalous.

His duties are administrative, medical, financial and legal. For three of these he may have had no previous experience or training. It is only natural that a medical man placed in such a position may be in conflict with his colleagues. The responsibilities are heavy and far too numerous for any single person. Many superintendents themselves wish to see the system abolished.

The medical superintendent and chief county medical officer form a bottleneck through which all matters relevant to a large hospital have to pass, both from the council to the institution and vice versa. In this way, many purely hospital problems are left unconsidered. It is essential that a wider basis of contact be established for further development in the municipal system.

It has been suggested recently that three war years have been deleterious to municipal hospitals. The voluntary system has suffered more heavily. Soon after the outbreak of hostilities, many municipal authorities intimated to their senior staff that, with the exception of those on the reserve, entering the Forces would terminate their contracts with the council. The voluntary hospitals raised no such objections and have suffered a larger loss of staff. In addition, the influx of consultants, junior medical staff, student house-officers and students eager to work, has made it possible in many cases for the first time to build up an adequate medical staff for the enormous amount of work done in the municipal hospital. It would appear that some of these hospitals have definitely gained through the war at the expense of their voluntary counterparts.

MUNICEPS.

THE SIZE OF LOCAL HEALTH AUTHORITIES

SIR,—Surely your leading article of May 15 creates quite unnecessarily a difficulty by making health services synonymous with hospital services. Health services are based on the home and the local environment. Hospital services may quite well be organised, though in some respects to the disadvantage of the patients, for a larger area. Coördination there must be, but that does not seem to present any insuperable difficulties. There is a substantial change in the facts of the situation since 1920. May not the medical profession be expected to move with the times?

Herne Hill, S.E. 24. C. E. A. BEDWELL.

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EXPERIMENTAL NECROSIS OF ISLET CELLS

SIR,—In commenting on our paper which appeared in your issue of April 17, Dr. Lawrence, while recognising the importance of the main result, necrosis of islet cells from alloxan, has very judiciously drawn attention to the need for caution in interpreting the symptomatology and biochemical findings in disordered sugar metabolism. It may be that in putting forward a single essential cause, for both the necrosis and the hypoglycæmia, in over-stimulation of the islets with over-production of insulin, the pathologist went too far towards simplicity of explanation. There was, however, the fact that the anatomical lesion was entirely new and it was not apparent that an explanation of its causation and effects could be found in the knowledge of the past, while there appeared to be no special reason to attribute importance to a supposed toxic effect on the liver which was unsupported by any evidence. Alloxan is a substance with quite low general toxicity, and the doses of it which were first recognised to affect the islets were large, corresponding weight for weight to ½ to ¾ oz. for an adult man, and even with such doses only relatively slight and inconstant changes might be seen in other organs. I regret very much that at the time the paper was written, now several months ago, the work of H. R. Jacobs (*Proc. Soc. exp. Biol. Med.* 1937–38, **37**, 407) had escaped our notice. He had observed not only the intense hypoglycæmia after intravenous alloxan, but also that the ensuing convulsions could be cured or averted by intravenous glucose with return of the animals to normal. This observation we have independently confirmed in a way which suggests that the only lethal effect of alloxan in these doses lies in its causing hypoglycæmia like that due to insulin and relieved in the same way.

The problem in sugar metabolism which is set in experiments with alloxan can no doubt be approached by various techniques, and it seems probable, as Dr. Lawrence suggests, that evidence of relative value may be obtained by comparison with acute disturbances of blood-sugar produced in other ways. The terminal hyperglycæmia, which goes also with hypothermia, due to diphtheria toxin, is striking by contrast and it may be significant that this is commonly associated with hæmorrhage and necrosis in the suprarenals although, as these are believed to be concerned largely in the mobilisation of sugar, an acute damage of them might, a priori, have been expected to cause the reverse, a hypoglycæmia. In this case, however, the hyperglycæmia may well depend rather on poisoned tissues being unable to use sugar even when an excess of insulin is supplied. There will probably be general agreement with the view that in the assessment of biochemical data in experiments a useful purpose will be served by continuance of correlation with histological findings.

Glasgow. JOHN SHAW DUNN.

THE RED CROSS

SIR,—The letter from Lord Amulree in your issue of May 1 requires some explanation. Of course a medical diploma does not protect in war, and physicians serving outside the RAMC are subject to the same treatment as all combatants. However, physicians and nursing personnel caring for the sick and wounded in war-time, whether belonging to the RAMC, the Red Cross or any voluntary association, are definitely protected by the Geneva Convention. In principle they cannot be taken prisoner and thus must be repatriated after falling into the hands of the enemy. In practice, however, the enemy keeps a certain number of them for the care of compatriots who are prisoners. It is true that the Geneva Convention has not been applied strictly in this war, and that although there has been some repatriation of medical personnel by the Italians this has not happened, as far as I know, in the case of doctors in German hands. Whether the Germans can base their action on their need of this personnel for the care of British and Allied prisoners is another question. It is not the Geneva Convention embodying the Red Cross principle that is at fault, but its mode of application. For this reason I have stressed the point that in future more definite international action should be taken in support of the Geneva Convention. I have emphasised the need for regarding the Red Cross principle as a not purely humanitarian one, for otherwise it could not develop in time of war, when humanitarian principles are not invoked. The Red Cross organisation is based on a realistic, a utilitarian principle, and contributes to the war effort of all nations. An efficient national Red Cross contributes greatly to the war effort of the particular nation. In fact, one of the conditions of an efficient war effort is the adequate treatment of wounded prisoners and civilian populations in conquered countries, but for this condition to be fulfilled a certain degree of neutrality as embodied in the Geneva Convention is necessary.

London, W.1. A. P. CAWADIAS, President, Greek Red Cross.

STERILITY

SIR,—In view of the fact that at least 10% of married couples suffer from involuntary sterility, it is obvious that the problem of such sterility is one of great national importance, not only because of the personal unhappiness it may cause, but because of the urgent need to increase our present birth-rate if a falling population is to be averted.

Not all cases of sterility are as intractable as might be supposed from the literature on the subject, and many yield to quite simple advice. Only in so far as this fails, is it necessary to institute more complex enquiry. In cases which continue to prove refractory, elaborate examination of both parties may be necessary.

Although many experts are interesting themselves in this subject, few facilities exist for a broad study of the problem, and for that coöperation between gynæcologist and male genito-urinary specialist which is essential to its solution. Nor, indeed, is there much likelihood that the average country patient who seeks advice in this matter can obtain expert help.

The Family Planning Association has long been in touch with working-class family life through the medium of its contraceptive clinics, scattered throughout the British Isles. It believes that there is a great opportunity to reach a certain type of patient who is not likely to present herself at a hospital out patients' department complaining of sterility, but who is nevertheless deeply disappointed by finding herself barren. Many such women have already asked for help at F.P.A. clinics, thereby demonstrating the reality of the demand.

The association has formed an ad-hoc committee which intends to organise clinics to deal with cases of sterility either by referring them, where necessary, to the appropriate hospital centres, or, where these do not exist, by providing such expert attention as facilities permit. Such sessions would be called "motherhood clinics," and would be held occasionally in the same premises as already existing birth-control clinics. Details of such developments will be communicated later to the medical press.

In this way there will be the beginnings of a nation-wide effort to eliminate the present distressing wastage of potential maternity.

Family Planning Association, 69, Eccleston Square, S.W.1. HORDER, President.

SERODIAGNOSIS OF SYPHILIS

SIR,—In your annotation of April 3, and in the paper by Rappaport and Eichhorn in the same issue, it is claimed that high salt concentration, as used in the Meinicke reactions and in the new test of Rappaport and Eichhorn, causes chemical inactivation of the serum, so that inactivation by heat is unnecessary. It is true that performing the serological syphilis tests in the presence of high salt concentration has the same effect in principle as previous heating of the serum. In developing the first flocculation test of Sachs and Georgi, I was able to demonstrate (with F. Georgi) as early as 1921 that unheated sera which usually do not show flocculation in normal saline have the same reactivity as heated sera if the tests are performed in salt solutions of higher concentration. However, the term "inactivation" is hardly applicable to the phenomenon. The correlation of heating with inactivation is actually only of historical significance. It originates from the early days of serological research when it was believed that heating the serum caused inactivation of the "complement" which was supposed to be a thermolabile toxin-like substance.

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Today we know, however, that the complement activity of fresh serum is not attributable to a single substance, but depends on the physical structure of the whole serum proteins. The latter—in particular the most easily precipitable euglobulins—lose by heating the reactivity which is necessary for their complement action. It is better, therefore, to speak of "stabilisation" rather than of "inactivation."

The reactivity of syphilitic sera in the Wassermann reaction is in fact decreased by heating, although at the outset one anticipated an increase because of the destruction of complement. On the other hand, unheated sera may only be used for the Wassermann reaction when certain technical conditions are fulfilled. Otherwise they are liable to give non-specific reactions. Heating the sera abolishes non-specific reactivity caused by the labile globulins because the latter become stabilised. In the flocculation tests unheated sera behave in a similar manner. They react with the lipoid particles, but flocculation is prevented. Higher salt concentrations inhibit the combination of the labile serum globulins and the lipoid particles and so permit flocculation to be obtained with unheated sera. In these circumstances, however, one cannot assume any inactivation, for the high salt concentration is only a corrective which may be eliminated by dilution with distilled water.

It appears important to understand the position clearly. Only by distinguishing between antibody reactivity and serum lability does the occurrence of non-specific reactions in serological tests for syphilis become understandable. Heating the serum and performing the tests in more highly concentrated salt solution is without influence on the combination between antigen and antibody, but both cause a stabilisation—heat by altering the most labile serum globulins, and sufficient salt concentration by preventing their reactivity.

School of Pathology,
Trinity College, Dublin. H. SACHS.

STATUS OF HOUSE OFFICERS

SIR,—I am heartily in agreement with Dr. Fendall in his strictures on the payment of house-officers. The only modification that I can suggest to his letter is that in many teaching hospitals, so far from earning 9*d.* per hour, a house-officer may be £100 out of pocket at the end of the standard series of appointments, as he is actually paid nothing at all.

As the remuneration of the whole profession is to be decided, we are told, before long, I hope those who have to do it will read, mark, learn and inwardly digest the severe remarks of Mr. Boythorn in "Bleak House" on this very subject before they come to a decision; otherwise the Royal College of Surgeons may get some remarkable new specimens.

Haywards Heath. J. W. SHACKLE.

Infectious Disease in England and Wales

WEEK ENDED MAY 8

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1458; whooping-cough, 2225; diphtheria, 643; paratyphoid, 7; typhoid, 12; measles (excluding rubella), 10,090; pneumonia (primary or influenzal), 745; puerperal pyrexia, 138; cerebrospinal fever, 61; poliomyelitis, 3; polio-encephalitis, 1; encephalitis lethargica, 2; dysentery, 193; ophthalmia neonatorum, 101. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on May 5 was 2049. During the previous week the following cases were admitted: scarlet fever, 113; diphtheria, 34; measles, 145; whooping-cough, 41.

Deaths.—In 126 great towns there were 1 (0) deaths from enteric fevers, 1 (0) from scarlet fever, 7 (4) from measles, 16 (2) from whooping-cough, 12 (0) from diphtheria, 45 (3) from diarrhœa and enteritis under two years, and 15 (1) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 7 deaths from diarrhœa, no other great town more than 3.

The number of stillbirths notified during the week was 221 (corresponding to a rate of 31 per thousand total births), including 20 in London.

Obituary

WILLIAM JAMES EASTWOOD

M CH ORTH LPOOL, F R C S

ACTING BRIGADIER, ARMY MEDICAL SERVICES

On the 1st of this month James Eastwood died, at the age of 40, while on service as consulting orthopædic surgeon in the Middle East. His death was entirely unexpected and the news has come as a shock. "It is often said that hard work never killed any man, but Eastwood's death makes one doubt the truth of this generalisation. For many years his hours of work had far exceeded the safety zone, but in working and in organisation he found his greatest pleasure."

A student and graduate of Liverpool University, where his outstanding scholastic career was equalled by his prowess in every branch of athletics, Eastwood soon showed a special interest in orthopædic surgery. He was fortunate to come under the influence of the late Sir Robert Jones, who inspired him with much of his own enthusiasm and implanted in him the fundamental principles on which his own surgical career had been based. Eastwood's worth was recognised early; he joined the staff of the Northern Hospital in Liverpool and by his ability, driving force and charm built a reputation which spread far beyond his own district. He was also a member of the staff of several other hospitals in the district, and in connexion with the Wigan Infirmary fracture service had formed in 1932 one of the first rehabilitation centres. As a teacher he had the ability to make his subject interesting to the most thoughtless and inattentive student, and his work in postgraduate instruction was of a very high standard.

When the war started he felt that it was incumbent on him to join the Army at the earliest possible date, and it was with difficulty that he could be restrained for a time. Two years ago he got his wish and was posted to the Middle East where he was given charge of a surgical division in a large general hospital. The division soon became a hive of fracture and orthopædic patients. Medical officers who had had a small training in orthopædics were sent to learn from him, and he guided two moderately experienced men. His ability, ready wit, and perseverance quickly overruled all obstructions to his work. Patients obviously appreciated that they were in first-class hands and wanted him to see them through, rather than be moved on, until the first stages of treatment were over. Although somewhat biased against physiotherapy, he made full use of masseurs as physical-training experts and occupational therapists. In treating fractures due to gunshot wounds, he never altered his ideas: he almost abhorred skeletal traction; he immobilised the fracture and neighbouring joints over a somewhat long period, but he never hesitated to urge the necessity for active movement from the moment when he thought this was advisable. His influence on surgeons in the treatment of fractures was apparent in the other hospitals in the area where he was stationed. "He had a fertile brain, was delightfully quarrelsome on detail and was determined supporter of H. O. Thomas and his chief, T. P. McMurray."

When Brigadier St.J. D. Buxton, the then consulting orthopædic surgeon for the Middle East, was forced to return home for health reasons, Eastwood was appointed to the vacant post. This he held for only a few months, but the same reports of enthusiasm, kindliness and organising ability had already come home. Colonel Buxton writes of a letter received since his death, "full of fun—stories of peripheral nerve injuries, of padding of plaster splints—but no word of his being under the weather. He realised he had a responsible post for one of his age and was determined to do his best for his country, his patients and orthopædic surgery."

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Mr. McMurray, to whom we are indebted for details of Eastwood's earlier career, speaks with deep regret of his early death, "particularly at this time in view of his work for the Army and the necessity for such men in the reconstruction inevitable when the war is over."

WILLIAM BREMNER HIGHET

MB NZ, FRCS; LIEUTENANT RAMC

Mr. Bremner Highet has been missing at sea since the beginning of December, and his loss is now presumed. Within two or three years he had made several valuable contributions to surgical research, and his qualities were such that he was chosen to establish the first nerve-injuries centre for the Army overseas. But he did not reach his destination.

He was 30 years of age and was born at Dunedin, New Zealand. He took his MB at Otago, where he was awarded junior, senior, and university national scholarships, and he held house-appointments at Dunedin Hospital. In 1935 he sailed with the second Byrd Antarctic Expedition as medical officer, and on his return, before coming to England, he spent three months visiting hospitals in the United States of America. From 1935 to 1937 he held resident posts at the Norfolk and Norwich Hospital, and while resident orthopædic officer there he became deeply interested in orthopædic surgery. As RSO at the Princess Beatrice Hospital he had charge of the fracture clinic and inaugurated a septic-finger clinic, and as surgical registrar at the Royal Cancer Hospital he made a thorough study of bone tumours. In April, 1940, he joined the staff of the Wingfield-Morris Orthopædic Hospital, Oxford, where he had been appointed Nuffield scholar in orthopædic surgery. The creation of the peripheral nerve centre later in the same year was followed by such an influx of cases that it soon became necessary to appoint a man who could devote all his time to nerve injuries, and at the end of 1940 Highet gave up his scholarship, and with a special research grant from the university took on the work.

No-one could have made better use of his opportunities. He examined every patient with great care; he assisted at every operation and became so dexterous and sound in his judgment, that it was soon possible to entrust him with the most intricate explorations of peripheral nerves. He blossomed out as a first-rate research worker. Mr. J. Z. Young welcomed him in his laboratory where, with William Holmes and F. K. Sanders, Highet carried out a thorough investigation into the evil effects of postoperative stretching on nerves sutured after extensive resection. Of their work together Mr. Holmes says:—

"When Highet burst into the laboratory for an afternoon's work he brought a tremendous enthusiasm to supplement his operative skill, and a gift for the solution of the decisive problems of the experimental method; he saw clearly what experiments were sufficient and necessary, and what results significant. We learnt a lot from him: he was intensely critical of work he thought unconvincing or unnecessary, and no weight of authority could prevent him from condemning methods or results which seemed to him unsatisfactory. Collaboration with him was made happy by the mental powers, which he carried so lightly, and by his charm and friendliness. We always looked forward to seeing him, no matter how tedious the work we had to do.

"During his last months in England he was unceasingly active in the preparation of his work for publication. Every spare moment he sat writing, either alone or with his collaborators, and each day saw an addition to a mass of only just legible manuscript. The fruits of this labour are still coming to us, and we should be grateful that he left so much ready for the press. But it seems sad that he left himself so little time then for the more orthodox pleasures, for he loved a party, and I think that he would like his friends to remember him as he was on these rare 'evenings off.'"

Highet also developed a technique for investigating anomalies of motor and sensory nerve distribution, he devised splints, and investigated nerve lesions produced by arterial ischæmia. In two years he published seven original papers, and was awarded the Jacksonian prize of the Royal College of Surgeons for an essay on peripheral nerve injuries. Of his abilities Prof. H. J. Seddon writes: "Good clinical scientists are rare, for it is unusual to find the keen impersonal precision of the scientist wedded to the humane understanding and intuition that mark the able clinician. In Highet these qualities were combined. At first sight he appeared rather cold-blooded in his pursuit of knowledge, but his patients knew better. They trusted him implicitly; he always told them what he was after and they regarded all his laborious investigations as an entertaining game. These men learned from him that to find out and to cure were one and the same. He was utterly reliable; his loyalty was of that rare kind that is quite untinged by intellectual sycophancy; his devotion to duty was unremitting and his industry unflagging. Let us hope that he is not lost, for he was one of the most promising men of his generation."

Mr. Highet leaves a wife and daughter.

Appointments

*ICHT, MENAHEM, MRCS: temp. deputy medical superintendent at Abergele Sanatorium.

FLEMING, G., MB: examining factory surgeon for Castle Douglas, Kirkcudbrightshire.

Colonial Medical Service.—The following appointments are announced:

GILLETT, J. A., MB: MO, British Honduras; Green, B. J., MB LPOOL, DTM and H: MO, Nigeria;
PARK NOBLE, G. S., MB GLASG., DOMS: ophthalmic specialist, Tanganyika Territory:
PICKLES, J. W., MB ABERD.: MO, Swaziland.

* Subject to confirmation.

Births, Marriages and Deaths

BIRTHS

LEIGH.—On May 16, at Ealing, the wife of Lieutenant P. R. W. Leigh, RAMC—a daughter.

MATTHEWS.—On May 13, the wife of Squadron-Leader D. N. Matthews, FRCS, RAFVR, of Wendover, Bucks—a son.

MCCALL.—On May 8, at Southborough, the wife of Surgeon Lieutenant A. M. McCall, RNVR—a son.

MORE NISBETT.—On May 8, at Scarborough, the wife of Surgeon Lieut.-Commander J. G. More Nisbett, RN—a son.

MORRISON.—On May 13, at Stirling, the wife of Lieut.-Colonel J. E. Morrison, RAMC—a son.

PIRIE.—On May 12, at Ashbourne, Derbyshire, the wife of Major I. B. Pirie, RAMC—a son.

REYNOLDS.—On May 10, the wife of Dr. S. J. Reynolds, of Streatham—a son.

RINKEL.—On May 8, at Holt, Norfolk, the wife of Dr. Ronald Rinkel—a daughter.

ST. JOHN-BROOKS.—On May 7, at Mussoorie, U.P., India, the wife of Major W. H. St. John-Brooks, IMS—a son.

WINTERTON.—On May 14, in London, the wife of Mr. Ralph Winterton, FRCS—a daughter.

MARRIAGES

NOLAN—HOCKIN.—On May 8, at Frome, James Paul Nolan, MB, to Joan Hockin.

TOPHAM—MARSHALL.—On May 8, at Ewell, Lawrence Garth Topham, surgeon lieutenant RN, of Leeds, to Olive Barbara Marshall.

DEATHS

COTTER.—On May 14, at Eltham Road, S.E.12, Cornelius Cotter, MB, NUI.

MACBRYAN.—On May 4, at Bath, Henry Crawford MacBryan, LRCPE, of Box, Wilts, aged 88.

MCCREADY.—On May 10, at Farnham, Henry Ernest McCready, MC, MD DUBL., colonel RAMC (T).

MCRAE.—On May 7, at Edinburgh, Douglas McRae, MD EDIN., FRCPE, of West Linton, late of Glengall, Ayr, aged 68.

MELLOR.—On May 15, at Hogsthorpe, Lincs, George Mullins Mellor, MRCS, aged 75.

NEWSHOLME.—On May 17, at Durrington Hill, Worthing, Sir Arthur Newsholme, KCB, MD LOND., FRCP, aged 86.

PATON.—On May 15, Leslie Paton, MB CAMB., FRCS.

ROBINSON.—On May 7, George Somerville Robinson, surgeon lieut.-colonel late Scots Guards, aged 85.

SHIRLEY.—On May 14, in London, Herbert John Shirley, CMG, MD LOND., FRCS, DL, lieut.-colonel RAMC (T).

STANLEY CLARKE.—On May 14, at Sturminster Newton, Dorset, Crispin Stanley Clarke, MD CAMB., aged 63.

MEDICAL HONOURS.—The following awards have lately been made to RAMC officers for gallant and distinguished services:

MBE.—Major L. E. C. Davies, BM OXFD; Major J. R. Kellett, MB DUBL.
MC.—Major G. H. G. Hope, MB GLASG.

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FUTURE OF MEDICAL SERVICES

STATEMENT BY BRITISH MEDICAL ASSOCIATION

WHEN the representative committee was authorised to enter into non-committal discussions with the Minister of Health, an assurance was given that from time to time a report of the position would be made to the profession. This is the first such report.

In the past two months discussions have been proceeding. In the course of such discussions, the Ministry put forward certain tentative proposals for a comprehensive medical service based on modified central and local administration and the employment of doctors as salaried officers, mainly whole-time, by a new type of local authority. The representative committee, considering that further discussion on the basis of such proposals would be unfruitful, met the Minister, and the joint parliamentary under-secretary representing the Secretary of State for Scotland, on Monday, May 17.

The representative committee made plain that though not empowered to commit the medical profession, it believed that such proposals would be contrary to the public interest and unacceptable to the great majority of the profession, and sought their withdrawal.

The Minister, in reply, stated that the only Government commitment on the subject of a comprehensive health service was that outlined by Sir John Anderson in the debate on the Beveridge report in the House of Commons in February. The Government was not committed as yet to any particular form of medical service, and the Ministry proposals in question were put forward only as a basis of discussion. He agreed to regard these proposals as "in the discard" and to a re-examination of the whole position. He stated that after further full consultation with the representative committee and other bodies with whom discussions had been taking place he would proceed to express his conclusions in the form of a white-paper which would then be open for consideration and discussion by the public and the medical profession before final decision by Parliament. He stated that he was not bound by any timetable in relation to the issue of a white-paper. He had not made up his mind and he did not wish that the proposals already put forward should be regarded as in any way prejudicing the issue of a white-paper, the form and substance of which had not yet been decided.

These assurances were accepted by the representative committee which decided to continue the non-committal discussions with the Ministry. The discussions will accordingly go forward on the basis of these assurances.

The representative committee asks for the continued confidence of the profession in pursuing these vital discussions on the understanding that at no stage will the profession be committed without prior consultation with it through the established machinery.

MATERNAL MORTALITY AND THE NEED FOR MIDWIVES.—The Minister of Health, speaking in London on May 12, said that the maternal mortality-rate for England and Wales last year was the lowest ever recorded—namely, 2·47 per 1000 births, compared with 2·77 in 1941 and 4·41 in 1934. Though the number of maternity beds had increased by more than 3000 since 1938, it did not keep pace with the growing demand under wartime conditions. "I hope that the district midwives will be able to ease the pressure by helping in every possible way the woman who stays at home to have her baby. We all know that it is much less easy for her now than in peacetime, but we are doing what we can to help to stimulate the supplies of home helps. . . . In trying to get more midwives so that more maternity beds can be opened, we look for help from the Ministry of Labour and also from the midwives themselves. I still feel convinced that if those midwives who are qualified but are not practising realised how much their country needs them, we should not have to ask so often."

Notes and News

FRESH WATER FROM SEA-WATER

To distil drinking water from brine for the use of men adrift in lifeboats has long been thought impracticable: but now, the Ministry of War Transport announces, this straightforward measure is to be practised. Three types of still have been devised for the purpose, one by the Department of Scientific and Industrial Research and one under the auspices of the Admiralty; the third is already being produced commercially in collaboration with the Ministry. It can produce half a gallon of fresh water for each hour it works, and thus on a 14-day voyage, working 10 hours a day, it will produce about 70 gallons of drinking water, or about twice the amount carried in a lifeboat intended for 40 people. It can take either solid fuel or paraffin, but is meant to work chiefly on briquettes of compressed coal, supplemented by waste material or wood recovered from the sea. The briquettes can be stuffed into odd corners of the boat, and the stills can be used to provide hot drinks and to dry wet clothes, spread against the hot sides. The other two types of still now being developed are paraffin-consumers and are expected to have a higher output in relation to fuel consumed. Shipowners will thus soon have a choice of effective equipment, and we may hope that survivors of marine disasters may in future be spared one of the worst aspects of their experience.

A NUFFIELD PROVIDENT ASSOCIATION

The Nuffield trustees have inaugurated a central provident association constituted on a non-profit-making basis, the solvency of which is guaranteed by Lord Nuffield's Fund to the extent of £150,000. Membership in the association is open to anyone under the age of 60 who resides or is employed in any part of England, Wales, Scotland or Northern Ireland, other than the London area in which a hospitals services association has already been sponsored by King Edward's Hospital Fund (see *Lancet*, 1943, i, 127), and there is no income limit to membership. The benefits offered are intended as grants-in-aid towards the cost of consultant and other specialist services and hospital pay-bed or nursing-home treatment. They do not include contributions towards general medical practitioner services or treatment. For hospital or nursing-home treatment of a member or his dependants £6 per week will be paid for an aggregate period of six weeks in any one year. Substantial grants will be made towards consultant and other specialist services during inpatient treatment. An adult member will receive up to £70 for any one operation or illness and a family may claim benefit up to £105 in any one year. The annual contribution for a member without dependants is £2 15*s*. There is no limit to the number of dependants included in a family membership. An adult dependant's contribution is £1 15*s*. per annum and 10*s*. is payable for each child under 18. Thus, a man and wife with two children would pay £5 10*s*. for a maximum benefit of £105 in any one year. The association's offices are at 16, King Edward Street, Oxford. Area sections are being organised at other centres including Edinburgh, Hull, Manchester, Tyneside, Hertfordshire, Surrey, and Lincolnshire. A Nuffield provident association is also being formed in Northern Ireland. Provident societies will have a large measure of autonomy, but rates of contribution and benefit will be uniform throughout the country. Removal from one area to another will not affect membership. After the war the trustees hope to extend the scheme to outpatient treatment and to provide full cover for families within certain income-groups.

Royal College of Physicians of London

Air-Commodore C. P. Symonds will deliver his Croonian lectures at the college, Pall Mall East, S.W.1, on Tuesday and Thursday, May 25 and 27, at 2.45 PM (not at 2.30 PM). His subject is to be flying stress.

Cancer Control Organisation for Edinburgh and South East Scotland

A meeting of the executive committee of the organisation was held in Edinburgh on April 28. Among the subjects discussed was how medical doctors might make fuller use of the organisation's arrangements for the issue of travel vouchers to patients attending Edinburgh Royal Infirmary for treatment or examination for malignant disease. The treasurer of the organisation is Prof. William Annan, CA, 22, Charlotte Square, Edinburgh.

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University of Oxford

The following have been appointed members of the committee of the Nuffield Institute of Social Medicine :—

The chairman of the medical advisory committee, ex officio (chairman); Prof. A. W. M. Ellis, DM; secretary of the Nuffield Provincial Hospitals Trust, ex officio (secretary); Prof. L. J. Witts; Lady Goodenough; Dr. Janet Vaughan; Dr. G. C. Williams; Mr. W. Hyde; Mr. A. D. Lindsay, chairman of the Nuffield Committee for the Advancement of Medicine, ex officio; Prof. J. A. Ryle, professor of social medicine and director of the institute, ex officio.

In a congregation held on May 6, the following degrees were conferred :—

BM, BCh.—M. J. Long, Roshun Patuck, *J. C. H. Dunlop, *G. K. H. Hodgkin, *D. M. de R. Winser, *L. E. D. F. Joubert, *D. H. Garrow, *G. D. W. McKendrick, *E. H. Hillyard, *T. H. J. Williams and *Sheila R. Tangye.

* In absence.

The Radcliffe prize has been awarded to Dr. R. H. S. Thompson.

Royal College of Surgeons of England

At a meeting of the council of the college held on May 13, with Sir Alfred Webb-Johnson, the president, in the chair, Mr. J. B. Hume was re-elected a member of the court of examiners for a year and Prof. R. V. Bradlaw a member of the board of examiners in dental surgery for three years. Air-Commodore Geoffrey Keynes was nominated external examiner in surgery for the fellowship examination of the Faculty of Radiologists.

It was decided to recognise the post of resident surgical officer at the Guest Hospital, Dudley, for the six months' surgical practice required of candidates for the final fellowship examination.

Mr. Arnold Sorsby was appointed research professor in ophthalmology at the Royal College of Surgeons of England and the Royal Eye Hospital for five years, and a professorship in experimental pathology was conferred upon Dr. W. E. Gye, FRS, director of the Imperial Cancer Research Fund. Professor Gye and Mr. H. G. Crabtree were appointed lecturers of the fund in the college for the ensuing year.

Mrs. H. P. Herbert was appointed a Leverhulme scholar for her research on the metabolism of proteins, especially in relation to their protective properties against disease.

Diplomas of membership were granted to Sheila W. Anderson, G. A. James, M. F. C. Walker, and to the candidates named in our report of the comitia of the Royal College of Physicians (*Lancet*, May 8, p. 603).

Venereal Disease in the Colonies

The Colonial Office has appointed a subcommittee of the Colonial Advisory Medical Committee to advise the Secretary of State on venereal disease in the Colonies. Mr. T. I. K. Lloyd, an assistant under-secretary of state in the Colonial Office, will be the chairman, and the members will include Sir Wilson Jameson, Sir Drummond Shiels, Dr. Mary Blacklock, Dr. Letitia Fairfield, Dr. Robert Sutherland and the medical advisers to the Secretary of State.

London County Council and Mass Radiography

In a report presented to the LCC last Tuesday, the hospitals and medical services committee refer to the Minister of Health's proposals for the early diagnosis of tuberculosis (*Lancet*, May 8, p. 593) which, they say, offer a prospect of great improvement on present methods of dealing with the disease. A mass-radiography unit will be delivered to the council shortly, and it is proposed to locate it at four centres in turn, two in the north and two in the south of London. The centres will require adequate dressing accommodation and facilities for the speedy marshalling of a substantial number of persons and for the technical requirements of the work. It is hoped to arrange them at hospitals or health centres, but in the early stages its use will be limited to the more urgent demands. It is estimated that the staff and the maintenance of the unit will cost £2100 in 1943–44, for which there is sufficient provision in the maintenance votes, and £3020 a year ultimately. "The proposed extended arrangements for the diagnosis of pulmonary tuberculosis will certainly mean some increase in the demand for bed accommodation in hospitals and sanatoria, and it is estimated that at least 100 additional beds will ultimately be required in respect of each mass radiography unit. It is doubtful whether this demand can be met for London in the council's own hospitals or in voluntary institutions with which the council has arrangements. On the basis indicated the additional expenditure for bed accommodation is estimated to be £23,000 a year a unit."

Local Authorities after the War

In a Chadwick lecture given in London on May 11 Dr. C. F. White, MOH for the City, said that whatever the Government's four-year plan may be it will involve local authorities in increased responsibilities. The authorities must not be so small that they cannot provide efficient services; on the other hand, they must not be so large that they lose the personal touch essential to successful administration. Many of the units of local government in London are, he thinks, too small; on the other hand, the London County Council is too big.

Society for the Relief of Widows and Orphans of Medical Men

At a meeting of this society on May 12, Dr. R. A. Young was elected president in place of the late Mr. Warren Low. During 1942 relief was granted to 56 widows, and £4400 were distributed. One of the widows, who died at the age of 95, had received nearly £4000 from the society in grants over forty-six years. Membership of the society is open to any registered medical man, who at the time of his election is residing within a twenty-mile radius of Charing Cross. Full particulars and terms of subscription may be obtained from the secretary, 11, Chandos Street, London, W.1.

American Library

The U.S. Office of War Information announced on May 10, the tenth anniversary of the Nazi burning of books, the formal opening of the reference library at the American Embassy, 1, Grosvenor Square, London, W.1. This library, designed for American, British and other United Nations officials, for research institutions, for business and for the press, has now been in use for several months, and as Mr. Richard H. Heindel, the director, said: "The experience gained will help us when the time comes to rebuild the libraries and intellectual life of the continent."

Anglo-French

The first London performance of Mr. Edward Knoblock's new play, *Bird of Passage*, is to be given at St. James's Theatre on May 31 at 2 PM, in aid of the Anglo-French bed in the new Queen Charlotte's. This bed provides free hospital care to wives and dependants of British and French service men. The play is based on an Anglo-French theme of today. Tickets (ranging in price from 4*s.* 6*d.* to 21*s.*) may be had from Mrs. Khan, Queen Charlotte's Maternity Hospital, 339, Goldhawk Road, London, W.6.

Medico-Legal Society

A meeting of this society will be held at 26, Portland Place, London, W.1, on Thursday, May 27, at 5.30 PM, when Mr. J. L. Stoves, PhD, will read a paper on the identification of animal fibres.

Medical Casualties

Among the casualties sustained in the loss of HM destroyer *Beverley*, T/Surgeon Lieutenant P. A. Rees, MRCS, RNVR, has been posted as missing, presumed killed. Captain G. S. Hodge, MRCS, RAMC, is reported missing in North Africa.

Royal Society of Medicine

At a meeting of the section of odontology of this society on Monday, May 24, at 4.30 PM, Mr. B. W. Fickling will read a paper on severe retrusion of the mandible treated by buccal inlay and dental prosthesis, and Sir Frank Colyer will describe specimens illustrating some points in comparative dental pathology. At the section of medicine on May 25, at 4.30 PM, Mr. R. Milnes Walker and Dr. A. M. Cooke will speak on laparoscopy, and Dr. A. F. Foster-Carter on anatomy of the bronchial tree. On May 27, at 5.15 PM, there will be a discussion on the relationship of hypertension to renal disease. The opening speakers are to be Mr. Kenneth Heritage, Dr. R. W. Scarff, Dr. Horace Evans and Mr. A. Dickson Wright. On May 28, at 2.30 PM, Sir Alexander Russell is reading a paper to the section of epidemiology and state medicine on the Scottish diphtheria campaign 1941–42. The section of disease in children are holding their annual general meeting on May 29, at the Hempstead House Base Hospital, Hemel Hempstead, and at 2.30 PM there will be a demonstration of cases by members of the staff.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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THE FORCES BEHIND SPECIALISM IN SURGERY *

VICTOR BONNEY, MS, MD, BSC LOND, FRCS
CONSULTING OBSTETRICAL AND GYNÆCOLOGICAL SURGEON TO THE MIDDLESEX HOSPITAL

"Continue in the faith."—ST. PAUL.

I STAND here to commemorate the work of John Hunter who, born 215 years ago, still in spirit presides over the art of British surgery. The honour is a responsible one, and I am the more diffident because, of the seventy-five previous orators, only three have been avowed specialists; two in ophthalmic surgery and one in orthopædic surgery. But I am sustained by the pride that, in me, gynæcology and obstetrics, the two largest special departments of surgery, are today and for the first time, playing the chief rôle in the affairs of our beloved College.

I

Specialism in the widest sense is a state in which the main intellectual activity of an individual, or a group of individuals, is permanently concentrated on one object, or one set of objects, and the forces compelling it are nearly as old as mankind itself. The present terrific struggle has made us painfully aware that the ultimate potentiality of a nation is strictly determined by the sum of its man and woman power, and similarly man's intellectual potentiality is, in the last resort, limited by the number of higher units which his brain possesses; but as we shall see, this absolute limit is never reached.

Although the average size of the frontal portion of the cerebrum of primeval man was, and of a few existing aborigines still is, smaller than ours, the size of it in the higher races has not altered within historic time, in spite of the enormous increase in the number of things known. If every new increment to knowledge required new neurons to be added to the frontal lobe, then comparing what I, as a student, had to learn with all that the student of today has to master, the head of the latter would resemble a pumpkin. All other organs of the body enlarge with use but the cerebrum is the exception, or at least the process is so slow that ages are required to make it perceptible.

From these and other considerations and the fact that a considerable area of the frontal cortex may be removed without impairing the intelligence, it seems clear that, of the multitude of higher units which the brain contains, only a proportion are ever trained, correlated and put into action, even by the most active minded, the remainder forming a reserve which can be drawn upon, provided that the *time* and *material* necessary for their training and correlation are *coincidently* available—and, of course, that the will to put them into action is forthcoming.

This time-material coincidence constitutes opportunity, and opportunity is the factor which limits the acquirement of knowledge long before the absolute potentiality of the brain is reached, but the limitation is variable. Thus there are certain kinds of knowledge the opportunity to acquire which is large and constant so that many persons can avail themselves of it. Conversely there are other kinds, the opportunity to acquire which is so small and inconstant that few can ever partake of it and consequently, in these kinds of knowledge, the number of the expert must always be small.

II

At man's beginning, the demands on the mind were so few and simple and the opportunity for satisfying them so abundant that each individual was self-sufficing. But as the intellect, passing beyond the immediately obvious, began to explore deeper and deeper into things, the limiting factor of opportunity came into play. Primitive man must originally have made both his own clubs and his own clothes and as in those early days fashions did not change, the need for making new ones was governed solely by how long the old ones took to wear out; so that, even supposing that a dandy of the Acheulean age made himself a new club and a new suit once a year, a long time had to elapse before he became expert in the making of either. It must presently have occurred to the tribal mind that better clubs and clothes would be produced if one man made all the clubs and another man all the clothes, but there is deep down in all of us, a natural repugnance to change, and most of all to change which carries with it the implication that another fellow can do the job better than we can, so I expect that some of the tribesmen resented the idea. I feel sure that certain of the elders opposed it and pointed out the dangers (and there are dangers) of narrowing a workman's outlook. But popular opinion prevailed and thus began the arts, crafts and callings and the first phase of specialisation.

As the ages rolled on, more and more occupations had to be segregated off, while each one grew in complexity, until at length certain of them became so multifarious that the opportunity afforded to a single mind was insufficient to fit it for all the demands the occupation made on it and these occupations had to be split up into departments. This, the second phase of specialisation, has resulted in the profound specialism which we see all around us today.

III

Passing from the general to surgery in particular, man at his beginnings had to treat himself, whatever the nature of the ailment. Then arose the medicine-man who combined the rôles of doctor, priest and wizard, the last of which continued to have some association with the healing art right down to the opening of the seventeenth century. In ancient Egypt the calling was priestly and, in the epoch of Greek civilisation, the priests and lay assistants of the temples dedicated to Æsculapius formed an hereditary medical caste. Throughout the dark ages this connexion with religion was maintained in Christendom for the monks kept the flame of medicine burning, but such surgical procedures as were then required were more and more delegated to certain of the lay brethren, usually the barber who, from his calling, was deemed most fitted to wield the knife.

The separation of surgery from medicine becomes distinct in England in 1308 when the Company of Barber-Surgeons is first mentioned and a second company, called the Guild of Surgeons, was existent in 1369. In 1540 these two companies united, but it was not until 1744 that the association with the barbers was dissolved and the surgeons became a separate company. Then, in 1800, this company became the Royal College of Surgeons of England and since then surgical knowledge has grown so great that the span of one life is much too short to contain the opportunity needed to acquire it all, and every surgeon today is compelled to specialise more or less.

At present the special departments of surgery are twelve in number: obstetrics, gynæcology, ophthalmology, laryngology, urology, proctology, anæsthesiology, orthopædic surgery, neurological surgery, thoracic surgery, reconstructive or plastic surgery and dental surgery; and of them the first is by far the oldest and the only one with an origin separate from surgery. Indeed, unless we accept the storied origin of Eve, which makes Adam the first surgical patient, midwifery antedated surgery, for the first attendant on labour must have been our common forefather.

Of all the departments of surgery, obstetrics is perhaps the most surgical, for pregnancy is a state induced by the rapid growth of a neoplasm, natural labour is to be regarded as an operation which the woman performs on herself, and when the obstetrician has to intervene he does so with his hands or his instruments. It is surprising therefore that for so many many centuries so operative an art should have been allowed to wander disconsolately between the confines of medicine and surgery, but the fact is explained by the independence of its origin and the circumstance that for a very long time its practitioners were not medical men. You will remember that at the time of the Exodus (1300 BC) two midwives, Shiprah and Puah, presided over Jewish midwifery and these ladies incurred Pharaoh's wrath by refusing to slay the newborn males. I have over a long period of years urged the recognising of midwifery as a department of surgery, both to raise the status of obstetrics and obstetricians and to complete surgery as a whole.

* Hunterian Oration, delivered on May 26, 1943, at the Royal College of Surgeons of England.

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With this exception all the other surgical specialties have branched off the main stem and the first indications of them are very old indeed. Thus trephining was performed in neolithic times, ophthalmic operations by the Babylonians in 2250 BC and splinting by the Egyptians before 1600 BC. In India, the medical classic Sushruta Samhitá, written about 500 BC but recording surgical practice long before that date, makes mention of cæsarean section, lithotomy, neurotomy, trephining and plastic repair of the nose. Hippocrates, about 500 BC, was familiar with thoracotomy, while Herodotus who wrote about the same date refers to artificial limbs and artificial teeth. Brasistratus (300 BC) treated stricture with an S-shaped catheter and Ammonius (200 BC) was the first western lithotomist. Celsus (first century AD) wrote about plastic operations on the nose and mouth, dental surgery, the removal of nasal polypi, the treatment of piles and fistulæ, lithotomy and the excision of goitre. Heliodorus (first century) is said to have cured stricture by internal urethrotomy. Galen (second century) operated on the nose, repaired harelip and removed the uvula. Soranus (second century) wrote the first special treatise on midwifery and the diseases of women. Paul of Ægina (seventh century) practised trephining, tonsillectomy, lithotomy and eye surgery. Albucasis (tenth century) described lithotrity as well as lithotomy. William of Saliceto (twelfth century) advocated suture of divided nerves. Lanfranc (thirteenth century) trephined for cerebral irritation, performed neurotomy, intubed the œsophagus and opened the chest for empyema, and John of Arderne (fourteenth century) carried out the operation for fistula-in-ano as it is performed today.

Even in those days there were specialists, notably among the cutters for stone and the couchers of cataract, and they used to travel about the country plying their craft; indeed Herodotus states that in his time, among the Egyptians, each physician applied himself to one region of the body only. Some were for the eyes, others for the head, others for the teeth, others for the intestines and so forth. From the medieval period up to the time of the founding of the Royal College of Surgeons, specialism continued slowly to increase. The Chamberlens, who invented the midwifery forceps, may be looked upon as the first of the modern obstetric specialists and, in the same century (seventeenth) we read in the memoirs of the Verney family how Edmund Verney the younger, who was evidently suffering from scoliosis, was treated at Utrecht by a specialist named Schott who applied an iron apparatus covered with leather, into which the patient was immovably fixed. This early orthopædist, like his modern counterpart, was a very confident surgeon for he agreed only to be paid if a cure was effected; also he was a very trusting man for the amount was left to the generosity of the patient. Edmund was cured and, as in after life he came to weigh 20 st., his backbone must have remained a strong one; but what he paid is not stated. Let us hope he was both grateful and generous.

IV

Thus we see that in very ancient times certain men had sight of those vast surgical fields which were to be exploited hundreds or thousands of years later; but excluding obstetrics all the surgical specialties, in their modern form, have appeared within the last 150 years and their rapid development did not begin to take place until the two great bars to the expansion of surgery, —pain and sepsis—were removed in 1846 and 1867 respectively. The dates of the founding of the special hospitals show how comparatively recent they are: the oldest of them, the Royal London Ophthalmic Hospital, was opened in 1804.

Again excluding obstetrics, the modern surgical specialties were all created by certain general surgeons who concentrated their main efforts on one particular facet of their art. These men initiated the special hospitals and special departments which have made possible the pure specialist and which supply the beginner with the material needful for his training so that his way is made comparatively easy. The task that these pioneers had to face was much more difficult for, unless the opportunity of acquiring special knowledge happened to be thrown in their way, they had to create it by their own ability and perseverance; and if in the future new surgical specialties arise those who lead the way will have to tread the same uphill path. Let us then consider how special experience can arise in the course of general surgery.

In the past, surgeons who chanced to practise in localities where, say, vesical calculus or cataract were unusually common, or who were attached to armies in the field, naturally attained outstanding skill in lithotomy, extraction of the lens or the surgery of injuries, and their services became specially sought in those connexions. The same thing happens today; for instance, the general surgeon who working in one of our midland cities where football and mining occupy the male inhabitants, sees in a month as many cases of knee-joint injury as his southern confrère sees in a year. Again, many general surgeons in the past have become attached to special hospitals and there have had the opportunity of applying their general surgical knowledge to the problems of the specialty, often with great benefit to the latter. In devout gratitude I recall the name of John Bland-Sutton, to whose inspiration I owe so much. It is however increasingly rare nowadays for specialism to be attained to in this way.

Special experience is often the result of special aptitude for, when a surgeon begins to achieve a reputation in a particular class of operation, a number of cases of that class are sent to him. Thereby his experience, skill and reputation are enhanced and still more cases of the same sort present themselves. A circle is thus established (whether vicious or not I leave you to determine) until at length, though still claiming to be a generalist, he has in fact become a specialist.

Not all general surgeons welcome this transmutation. I knew one who was very anxious to become distinguished in a department of surgery quite different from that for which he was widely known, and indeed his performance in the sphere of his ambition was good. But it was of no use; the medical and lay public had irrevocably decided the kind of surgery he was to do and the old class of case continued to roll in and the desired class to keep away. I am reminded of a celebrated author who told me that he hated his best-known book because the public expected, and indeed insisted, that he should write others exactly like it. Who determines these matters in the first instance for us? The house-surgeons who help us, the dressers we teach, the nurses who wait on us; these form the inexorable jury which notes our shortcomings and acclaims our good work. Their criticism is merciless but their verdict is just, and he who has to pass through that fiery trial can rest assured that, if there be true metal in him, it will show the brighter for it: but woe betide the dross.

Lastly the opportunity for acquiring special experience can come into being as the result of the surgeon's overmastering determination to obtain it. There have been many such men in the history of surgical specialism, men who pressed on with the quest against discouragement and difficulty, courageous explorers of the dark, resolute to achieve their aim.

V

Like the paleolithic tribesmen of whom I have spoken, we of the tribe of surgeons have been brought (not very willingly) to recognise that better surgical work is produced if, say, A confines his chief activities to the abdomen, B to the thorax, C to the cerebrospinal system and so on; provided always—*and it is an essential proviso*—that neither A, B, C or D, or the whole alphabet if you like, loses touch with surgery as a whole. Specialism has been scoffed at as a state of "knowing more and more about less and less"; but the whole trend of modern science refutes the gibe, for it increasingly finds in the study of the minute the way to the understanding of grosser things; and if, in perfecting the units of surgery, we can at the same time maintain them in cohesion, we shall perfect surgery as a whole.

But in this question of cohesion lies the whole difficulty and danger. Too restricted attention to one subject cramps the outlook, narrows the mind, destroys the sense of proportion, deforms the specialty and tends in the end to transform it into a cult. The founding of hospitals devoted to special departments of surgery is, as we have seen, of comparatively recent date. These

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institutions have conferred great benefits on the specialties for many of the modern advances are the result of work within their walls. But, as in this naughty world nothing worth having can be got for nothing, so the benefits conferred are offset by the introduction of a danger. It is this; that, whereas before their advent the surgeon made the specialty, it is now possible for the specialty to make the surgeon. This product is the specialist *ab initio*, whose knowledge is derived solely from the specialty, so that, unless he possesses unusual powers of educating himself, he will remain a person of confined vision and narrow ability. The immediate effect on the specialty is bad, but its ultimate effect, though not so obvious, is worse, for his successors-designate, who work under him and learn from him, are in grave danger of inheriting the same limitations. It may be argued that it is up to any man to strike out new lines of thought for himself but the chains shackled on us by faulty teaching are exceedingly hard to break, and some persons continue to wear them throughout their working lives. Moreover, duds beget duds, not merely by teaching and example but also because they, very naturally, prefer to work with their own kind; and there have been institutions where, for a long time, a level of dismal mediocrity was maintained simply for this reason. Over-specialism is not only harmful to the specialty, but is injurious to surgery as a whole for, the wider conception being lost, the specialty becomes self-centred and parochial and sooner or later this attitude tends towards a movement for complete separation. One such severance has already occurred and there are threatenings of others which, unless countered, will end in converting the strong tree of surgery into a scrub of weakly-rooted saplings mutually deforming one another.

VI

What can be done to guard against over-specialisation and the ill results which spring from it? First, every aspirant to surgical specialism, before ever he begins to practise the specialty, should have undergone an adequate training in surgery in general, and (excepting dental surgeons and anæsthetists) as evidence of such should have attained a fellowship of one of the royal colleges. That of this college is the highest prized, and attempts have been made at different times to mitigate the rigour of the examinations on which its bestowal depends and lighten the burden of the training which has to precede them. But these examinations have for their object not only the testing of knowledge but the possession, or otherwise, of qualities equally necessary to a surgeon: industry, for his life should be one of unremitting work; self-abnegation, for he will have to forgo many pleasures; determination, for the calling pre-eminently demands moral courage; quick-wittedness, because in surgery vital decisions have to be made instantly. Would anyone of us here, whose life one day may depend on a surgeon's qualities, have it otherwise?

Since all parts of our art overlap and nothing would be so harmful as its division into a number of watertight compartments, the conception that his prime allegiance is owed to surgery as a whole and not to the subsidiary shrine wherein his immediate service lies, should be rooted in the mind of everyone working in a special department of surgery, and all he does to advance his own particular craft should be undertaken with that obligation in view. He should make a point of seeing the work of surgeons practising in other departments, not only to keep his mind open but to try to pick up ideas and suggestions transferable to his own department, for the basic principles of surgery are applicable everywhere.

It cannot be too strongly insisted that no-one should practise in a special department of surgery unless he is competent to deal with every condition with which he may be confronted. For this reason he should not rigidly limit his operative work to that peculiar to the specialty which he professes, for occasions will certainly arise when such limitation will be harmful or even disastrous to a patient. Thus, in my own calling, the gynæcological surgeon should be familiar with the surgery of the bladder, the rectum and the abdominal contents generally, and should perform such operations as occasion demands, for otherwise he cannot remain competent in them. I have known surgeons whose fields of work lay in contiguous regions of the body, intensely indignant when the other of them invaded his neighbour's territory. Such an attitude suggests inability to think clearly; but if it arises from a fear that their practices will suffer, I can assure them that such mutual excursions, while immensely increasing their individual competence, will have no such effect.

It is the duty of this college to epitomise the whole of British surgery and to keep within the fold all its manifold activities. Unfortunately in the past, like many other old institutions, it has been complacent and short-sighted, and the disruptive tendencies to which I have referred would almost certainly never have arisen, had it realised earlier the strength of the forces behind specialisation, and reorganised itself to meet the needs of the future. Of recent years a wider view has come into being, but to implement it much more has got to be done.

I should like to see more representatives of special surgery on the council, for taking the great hospitals in aggregate more than half the surgical staff (not counting dentists and anæsthetists) works in the special departments; the disproportionate number of general surgeons who appear as candidates for the council not only wrongly suggests that specialism in surgery postulates a lack of interest in surgery in general but is a way to make that suggestion come true. Further I am strongly of opinion that part of the final fellowship examination should be conducted by a surgical specialist or specialists. Our famous museum has suffered grievously at the hands of that accursed race whose purpose, slowly accumulated, compassed the destruction of all that is good, gracious and great in human life. That vile purpose is doomed to perish and our museum is going to arise again and when it does so I want to see it contain departments, each of which shall be the shrine, the meeting place and the spiritual home of one of the specialties and, like the chapel of an Order in a cathedral, stand as the outward and visible sign of the unity of the part with the great whole. To form, extend and keep live these departments, delegates from the specialties will have to be coöpted. Changes on these lines are I hold imperative if we are to keep this college in the proud position it has occupied in the past and maintain it, not merely as the root of the main stem of British surgery, but as the source from which all its branches derive their strength and growth.

VII

I have traced the course of specialism in surgery and shown that it is only one expression of that universal specialisation which has been forced on man's intellectual activity by the shortness of life and the limitations imposed by opportunity. If its appearance and development were compelled solely by the pressure of circumstances there would be little to be proud about, but there is another aspect to be considered. Will is the motive power which puts the intellect into spontaneous action. When existing for the sake of the thing itself we call it aspiration, when aroused for the sake of what the accomplishment will bring, we call it ambition. The one is an impulse of the spirit, the other a product of the reasoning mind; but without the goad of one or the other nothing much has ever been achieved.

Modern physical science no longer supports the materialist philosophy of the last century,[1] but, I think, tends more and more to justify the intuition which perceives the brain not as a factory wherein are produced all impulses and thoughts but as an organ of which the frontal grey matter forms the keyboard. The more elaborate the organ, the greater and more varied are the musical effects it can produce; if the keyboard be defective or damaged there is no harmony; if it be destroyed there is no sound, but that which plays upon it remains. Now there can be very few persons so materially-minded that the spiritual factor in will is entirely wanting, and I submit that there exists in almost all of us an urge to perfection—not the perfection that is one thing to me and another thing to you, but absolute or abstract perfection. We cannot fully define this concept, but we can confidently assert that it is something which in its nature is entirely fitting and entirely final, and that it shares these attributes with absolute beauty and absolute truth, the three forming a

1. See Eddingtons's The Nature of the Physical World, 1928.

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trinity of which each member is the profile of the same entity viewed from a different angle; so that when the craftsman seeks perfection, and the artist and poet seek beauty, and the scientist and philosopher seek truth, they are in fact all seeking the same thing.

The impulses to perfection, beauty and truth are quite distinct from reasoned thought on the one hand and the reflex emotional states on the other, nor can they be explained by any philosophy based on materialism. Plato 2300 years ago taught that the world as it appears to our minds is only the shadow of what is real; and modern physical science goes further, for it conceives it merely as a symbol of ultimate reality; but, if any portion of ultimate reality be permitted to leak past the thick veil which surrounds us, these spiritual impulses are surely part of it, pointing as they do to something fixed and unchangeable with which, for the brief spans of their existence, our bodies are in touch.

The urge to perfection is disclosed very early in the history of mankind, for many of the chipped flint implements are fashioned with an artistry beyond the mere mechanical needs of the tool. Still stronger witness is the beautifully finished axe-head of neolithic man. It could have cut no better nor lasted longer than that chipped by his paleolithic ancestor, yet what an amount of endeavour he expended on it. We recognise the same impulse in the carved corbel high above the cathedral floor, in the illuminated missal hidden in the dusty library, in the decorated backplate concealed within the case of a seventeenth century clock and in the work of every craftsman of today who, often in obscurity, joyously sacrifices his time and his strength in the endeavour to make his work perfect. The urge to perfection has had this effect on surgery: it has impelled certain surgeons to elect to try to do a few things perfectly rather than to do a number of things well, and this spiritual dedication to the ideal of perfection is the crowning justification and the glory of surgical specialism.

> "One instant's toil to Thee denied
> Stands all Eternity's offence.
> Of that I did with Thee to guide,
> To Thee, through Thee be excellence."
>
> "Who, lest all thought of Eden fade,
> Bring'st Eden to the craftsman's brain—
> Godlike to muse o'er his own Trade,
> And manlike stand with God again."

VIII

From time to time men appear whose impact on their calling is so great that the mark is permanent, like the fabled impress of Buddha's foot on the rock. The pageant of surgery shows us many such great ones, moving on in stately procession, each, ere he passes, making a lasting contribution to the art. Their gifts have been various: inventions, discoveries, the fixing of knowledge, the raising of ideals, or that heroic appeal, so attractive to the young mind, which dresses the drab details of everyday work in the shining garments of adventurous romance—the romance of high endeavour and high faith in ordinary things, the true romance.

> "Yet may I look, with heart unshook
> On blow brought home or missed—
> Yet may I hear, with equal ear
> The clarions down the List,
> Yet set my lance above mischance
> And ride the barrière!"

That which they bequeathed to us was, and still is, a part of themselves, so that in our surgical work we are surrounded by an invisible multitude, and at no time is its presence so clearly sensed as on occasions like this, when we come together in the temple of surgery humbly to acknowledge our debt to the past.

Certain rare lives epitomise and give form to the shadowy aspirations common to most men, and among this unseen company which crowds around us here John Hunter stands supreme: not for what he discovered or even for the vast material he left us, but because the intense spiritual force of his example has crystallised about his memory the ideals of the host of surgeons treading after him, until transfigured into a concept of the perfect surgical life it has become the great tradition which guides and inspires our calling. He bestowed on surgery a religion, whose service gathers all its units together; the units which, like tesserae, are by themselves of small account, but cemented side by side make up the magnificent mosaic of the Art of Surgery.

VITAL STATISTICS OF 1942

PERCY STOCKS, M D CAMB, D P H
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THE vital statistics of England and Wales in 1942 would have been remarkable even in times of peace. The standardised death-rate of civilian females was 6·80 per 1000 living, of which about 0·08 was attributable to enemy action and the selective effects of recruitment on the civilian population. The previous lowest rate was 7·43 in 1939, so the third year of war produced a rate 9% better than any peace year had done. Civilian males gave a standardised rate of 9·54 which was 0·18 below the previous record of 1939, despite the considerable inflation of the rate by selective recruitment, which is difficult to evaluate accurately for males, and the inclusion of deaths of civilians from enemy action.

Examination of death-rates for separate age-groups in the years before 1942 shows that for every age-period under 45 the year 1939 registered the lowest rates, whereas for every age-period over 45 1938 was the best year, and that this applied to each sex. The strange happening that in 1939 rates continued to decline at ages up to 45 but retrogressed at all higher ages has not yet been explained, and the next two years were too much disturbed by the unkindnesses of climate and war to throw any light upon it. In 1942, however, the story of these rates can be taken up again, for women at least, and it presents fresh surprises which may help towards a solution of the 1939 mystery. In table I the 1939 rates

TABLE I—TREND OF CIVILIAN DEATH-RATES AT VARIOUS AGES FROM 1938 TO 1942

Age-group	1939 rates		1942 rates			
	% of 1938		% of 1939		% of 1938	
	M	F	M	F	M	F
1–	76	76	99	97	75	73
5–	86	80	104	97	89	78
15–	94	97	..	100*	..	98*
25–	97	99	..	97	..	97
35–	97	98	..	92	..	90
45–	101	101	93	90	94	91
55–	105	102	92	88	97	89
65–	103	104	92	87	95	91
75–	107	108	87	86	93	93
85 up	107	110	83	83	88	91

* Corrected to include non-civilian women also.

are expressed as percentages of those in 1938, and in succeeding columns the 1942 rates are expressed as percentages first of 1939 and then of 1938 figures. Mortality indices for the first year of life are influenced at the present time by the rising birth-rate and other disturbing factors, and are best omitted from this discussion of trends until the fully corrected rates are available. Civilian rates for males between the ages of 15 and 45 in 1942 were greatly affected by physical selection, which tended to leave behind in a much reduced population the bulk of those already suffering from disease, and thus to enhance the mortality per 1000 of that population. Comparisons with 1938 or 1939 for these groups can give no useful information about the health position and they also are omitted from the 1942 columns. Similar considerations apply to women aged 15–25, but it can be stated that after allowance has been made for the effect of recruitment into the women's services the 1942 death-rate amongst women of this age-group was approximately the same as in 1939, giving the corrected figure of 100 in the 4th column and 98 in the 6th. At other age-groups of women the effects of selection on the rates may be discounted as unimportant.

Comparing female death-rates in 1939 with those in 1938, the ratios show a progression as one passes up the age scale from a 24% fall in childhood to a 10% rise in old age, the age-period around 40 registering no change. Comparing 1942 rates with 1939, the ratios show a progression of the opposite kind from a 3% fall in childhood

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to a decrease of about 15% in old age. Some important influence tending to reduce mortality must have operated first upon the younger ages in 1939 and then spread up the age scale during the years 1940–42. Natural or social causes can scarcely have produced this phenomenon; but sulphonamide therapy, applied in the first instance, like most new remedies (e.g. insulin), to younger patients whilst the drugs were in short supply, and later to older people also as they became more plentiful, provides, I think, a possible and adequate explanation. Much of the mortality of childhood, and indeed at all ages, arises from the infective complications of diseases which, without those complications, are not very fatal, and it would not be surprising if by 1942 the effects of sulphonamide therapy should have become evident throughout the age scale, with the single exception of the young-adult period when tuberculosis and violent causes are together responsible for most of the mortality. If this be the true explanation, analysis of the deaths by cause ought to show that the disease groups likely to have been treated by sulphonamide drugs (1) accounted for most of the decline in deaths of children from 1938 to 1939, and (2) registered a much greater proportionate decline in death at all ages from 1938 to 1942 than did other groups of diseases. As will be shown below, the data so far available indicate that this did in fact happen.

CHILDREN UNDER 15 YEARS OF AGE

The live births registered in 1942 numbered 654,579, compared with 587,228 in 1941, 621,204 in 1938, and 580,413 in 1933 after which the crude birth-rate began to recover from its prolonged fall. The increase in births in 1942 compared with 1938 was rather greater than that which occurred between 1933 and 1938. Stillbirths formed 33 per 1000 total births, this proportion having declined steadily from 38 in 1939.

The infant-mortality rate, defined in the conventional manner as the per-mille ratio of the deaths at ages under 1 year registered during the year to the number of live births registered in the same year, was 49 in 1942, compared with 59 in 1941, 56 in 1940 and 50 in 1939 (the lowest recorded up to that time). With a rising birth-rate, however, the conventional rate may be appreciably below the corrected figure obtained by relating the deaths in 1942 at each age-period to the number of infants who were born alive at the appropriate interval of time before the deaths occurred. Thus most of the infants who were at risk to die at ages 9–12 months during 1942 must have been born in the year 1941, and they numbered about 60,000 fewer than the live births registered during 1942. All the necessary data are not yet available to complete the calculation of the corrected infant-mortality rate, but it is likely to be either 50 or 51, not appreciably different from the rate achieved in 1939.

TABLE II—DEATH-RATES AT AGES 1–2, 2–5, 5–10 AND 10–15

Age	Annual rate per 1000 living							
	1931–5	1936	1937	1938	1939	1940	1941	1942
1– 2	13·1	10·7	9·7	8·4	6·2	8·4	9·3	6·0
2– 5	4·4	3·8	3·5	3·3	2·6	3·6	4·0	2·6
5–10	2·2	2·0	1·9	1·9	1·5	2·0	2·1	1·5
10–15	1·4	1·2	1·2	1·2	1·0	1·4	1·4	1·0

Table II shows that the death-rates of children in the second year of life, always very sensitive to environmental conditions, was decreasing about 7% annually between 1931 and 1936; in 1937 it fell by 9% and in 1938 by 13% but in 1939 by 26%. The rate was higher during 1940–41 but in 1942 it fell again to slightly below the level reached in 1939. At ages 2–5 the rate was declining up to 1938 by about 5% annually but in 1939 it fell by 21% and after a considerable set-back in 1940–41 returned to the 1939 level in 1942. At ages 5–10 and 10–15 the same thing happened, 1942 rates being equal to the low levels attained in 1939.

The causes of death responsible for the remarkable decrease in 1939 are indicated for the age-period 1–5 years in table III. Measles accounted for more than one-third of the decrease in deaths from 1938 to 1939, and part of this was due to the lower prevalence of the disease; but the rate of 71 per million was far below that in any previous year of low prevalence. Pneumonia accounted for nearly two-fifths of the decrease, the 1939 rate being only 62% of that in 1938 and 42% of the mean annual rate in 1931–35. The 1942 rate showed a further fall of 16% from the low level of 1939. Diseases of the throat and ears, mainly streptococcal infections in the fatal cases, registered rates of 154 in 1931–35 and 148, 136, 139 in the next three years, but the rate then fell to 94 in 1939,

TABLE III—DEATH-RATES PER MILLION AT AGES 1–5 BY CAUSE

—	1931–5	1936	1937	1938	1939	1940	1941	1942
Cerebrospinal fever	102	71	83	69	52	248	221	131
Whooping-cough	444	382	330	221	221	128	475	+
Measles	758	759	276	419	71	208	273	+
Scarlet fever	100	73	57	57	30	19	25	+
Pneumonia	1727	1324	1395	1164	724	1138	997	609
Bronchitis	278	196	194	147	138	218	191	110
Ear and mastoid disease	69	77	66	70	46	43	35	+
Mouth and throat disease	85	71	70	69	48	43	41	+
Appendicitis	67	74	75	66	56	56	48	+
Tuberculosis	596	468	479	451	401	436	623	466
Diphtheria	457	455	454	414	342	398	482	303
Other diseases	1425	1117	1208	1019	943	1069	1050	+
Violent causes	444	441	434	434	422	815	835	+
All causes	6552	5508	5121	4600	3494	4819	5296	3424

+ Rates not yet available.

86 in 1940 and 76 in 1941, a remarkable drop since 1938. Appendicitis mortality also fell from 75 per million in 1937 to 56 in 1939 and 48 in 1941, and bronchitis from 194 in 1937 to 138 in 1939 and 110 in 1942. Scarlet fever showed also a rapid fall in death-rate after 1938, but this rate has been declining for many years.

Aggregating all these disease groups likely to have been specially influenced by sulphonamide therapy, separating measles, whooping-cough and cerebrospinal fever whose variable prevalence affected the death-rates, and comparing with other groups of causes, the trend of rates from 1937 to 1939 was as shown in table IV.

TABLE IV—DEATHS FROM DISEASES LIKELY TO BE INFLUENCED BY SULPHONAMIDES

—	Rates per million at ages 1–5			% of previous year	
	1937	1938	1939	1938	1939
Measles, whooping-cough, CSF	689	709	344	103	49
Pneumonia, scarlet fever, bronchitis, throat and ear diseases, appendicicitis	1857	1573	1042	85	66
Tuberculosis	479	451	401	94	89
All other causes of death	2096	1867	1707	89	91

The next two years were disturbed by war conditions and 1942 rates are not yet available for all the diseases, but the 1938–39 rates reflect the first effects of the new drugs. It is doubtful whether national vital statistics have shown any more remarkable achievement than the halving of the total death-rate from disease at the pre-school age-period in the course of 6 years (6·11 per 1000 in 1931–35, 3·07 in 1939), a result to which chemotherapy undoubtedly contributed.

Diphtheria deaths and rates among children for the years 1939 to 1942 are shown in table V.

TABLE V—DEATHS FROM DIPHTHERIA

Age-group	No. of deaths				Rate per million			
	1939	1940	1941	1942	1939	1940	1941	1942
0–	816	973	1181	780	285	338	416	255
5–	913	1043	980	727	323	373	355	264
10–15	253	284	229	178	83	95	78	61
Under 15	1982	2300	2390	1635	228	266	280	192

The rate at ages under 5 in 1942 was the lowest ever recorded, and those at 5–10 and 10–15 were the best except in 1924. The rate of 192 per million childre under 15 was the best recorded, the nearest to this being 223 in 1932, 225 in 1924 and 228 in 1939.

TUBERCULOSIS AND SYPHILIS

Deaths from respiratory tuberculosis at all ages (including non-civilians) numbered 20,987 in 1942

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compared with 23,633 in 1941, a decrease of 11%; the corresponding numbers in 1938, 1939 and 1940 were 21,282, 21,542 and 23,660 respectively (table VI). Tuberculosis of the meninges and nervous system registered 1993 deaths compared with 2365 in the preceding year, a decrease of 16%; and for other forms the total was 2564 compared with 2670, a fall of 4%. The total deaths from all forms of tuberculosis (25,544) were 11% fewer than in 1941, and almost the same as in 1938 (25,539) and 1939 (25,623). During the period from 1930–32 to 1936–38 tuberculosis deaths were decreasing by about 4% annually, and had the decline continued at that rate there would have been about 21,700 deaths in 1942, so there is still much leeway to be overtaken.

TABLE VI—TUBERCULOSIS DEATHS 1938–42

Year	Respiratory		Meningitis		Other forms	
	M	F	M	F	M	F
1938	12,445	8837	918	873	1343	1123
1939	12,702	8840	868	816	1361	1036
1940	13,920	9740	957	929	1424	1174
1941	13,985	9648	1195	1170	1457	1215
1942	12,511	8476	1021	972	1402	1162

Syphilis, recent or unspecified, was certified as causing 898 deaths, compared with 1000 in 1938 and 968 in 1939; and deaths from locomotor ataxia, general paralysis of the insane and aortic aneurysm totalled 1892, compared with 2311 and 2194. The congenital form has, however, registered no significant change since 1938.

RHEUMATISM, GOITRE, DIABETES, ANÆMIA, PEPTIC ULCER

The remarkable decline in deaths from acute rheumatism continued, the totals in the five years 1938 to 1942 being 1104, 955, 851, 639, 503. In 1931–36 the annual average was 1201.

Exophthalmic goitre deaths also decreased again as in 1940 and 1941, the 1942 total being only two-thirds of that in 1939.

	1938	*1939*	*1940*	*1941*	*1942*
Males	162	174	164	140	119
Females	1187	1206	1022	817	752

Diabetes deaths, which increased in 1939 and 1940, began to fall in 1941, as indicated in table VII.

TABLE VII—DEATHS FROM DIABETES

		1939	*1940*	*1941*	*1942*
Jan.–June	M	1015	1195	1071	949
	F	1737	1814	1704	1538
July–Dec.	M	873	854	751	680
	F	1536	1489	1339	1260

Comparing the figures for each half-year separately, owing to the constant seasonal variation, it is seen that the decrease set in early in 1941, after sugar rationing had been in force for a year.

Pernicious anæmia deaths, which increased each year from 1938 to 1941, showed some improvement in 1942, the numbers in the five years being 1771, 1922, 2167, 2422, 2238.

Gastric ulcer deaths, which had increased from 3204 in 1938 to 3893 in 1940, with slight improvement to 3664 in 1941, dropped to 3048 in 1942; duodenal ulcer deaths, which had risen from 1539 and 1554 in 1938–39 to 1931 and 1934 in 1940–41, fell to 1699. The total for peptic ulcer was, therefore, almost the same as in 1938. The period of high mortality from this cause was from early in 1940 to mid-1941, the successive half-year totals during 1939–42 being 2637, 2412, *2908, 2916, 3372*, 2226, 2627, 2120.

DISEASES CHIEFLY OPERATIVE IN ADVANCED AGES

Cancer deaths totalled 70,422 in 1942, compared with 67,154 in 1939, but an increase of this order was to be expected owing to the rising population of old people. Between 1936 and 1939 a similar increase in deaths was accompanied by a fall in the standardised death-rate for cancer, and it may be concluded tentatively that the wartime rise in these deaths is fully accounted for by the increasing numbers at risk. Cancer of the mouth and pharynx, however, has registered a fall from 2994 deaths in 1939 to 2787 in 1942.

The trend of deaths classed to degenerative heart disease, arteriosclerotic diseases, gangrene, nephritis and senility is shown in table VIII.

TABLE VIII—DEATHS FROM DEGENERATIVE CONDITIONS AND NEPHRITIS

—	1938	1939	1942
Diseases of the myocardium	75,691	82,645	75,733
Coronary disease, angina pectoris	15,409	17,856	18,722
Intracranial vascular lesions	44,697	48,672	48,382
Gangrene	741	774	548
Other arterial disease, hyperpiesis	11,417	12,888	12,968
Nephritis	15,337	14,775	13,379
Senility	15,399	17,267	15,855
Total	178,691	194,877	185,587

Nephritis and gangrene deaths have decreased, but deaths attributed to coronary disease and angina pectoris continue to increase. Cerebral vascular lesions and other arterial diseases registered little change from 1939, although myocardial degeneration and "senility" deaths returned to 1938 levels.

DISEASES PROBABLY INFLUENCED BY SULPHONAMIDE TREATMENT

In table IX have been grouped together the principal diseases whose fatality, either from the disease itself or because of infective complications, might be expected to be appreciably influenced by sulphonamide therapy. In group A are separated those diseases whose prevalence was, or may have been, widely different in the years compared, thus affecting the numbers of deaths; and group B consists of the remainder. Cerebrospinal fever notifications numbered 6029 in 1942 and the ratio of deaths to notifications was 20% (22 for civilians, 8 for non-civilians). In 1939 notifications numbered 1500 with a 34% fatality ratio and in 1937 they were 1140 with a 61% ratio. Had the fatality of pre-sulphonamide years been operative in 1942 there would have been about 3700 deaths instead of 1206. On the other hand lower measles prevalence in 1942 must have accounted for part of the drop in mortality compared with 1938, but it is doubtful whether this was true of whooping-cough. In the aggregate Group A showed a reduction of nearly

TABLE IX—DEATHS FROM "SULPHONAMIDE GROUP" OF DISEASES

—	No. of deaths			1942 % of 1938
	1938	1939	1942	
Group A—				
Cerebrospinal fever	655	517	1206	184
Scarlet fever	311	181	103	33
Whooping-cough	1052	1229	799	76
Measles	1524	303	458	30
Gonococcal infection	44	36	33	75
Group B—				
Erysipelas	342	248	141	41
Lobar pneumonia	9753	6977	5933	61
Other pneumonia	17,714	16,426	14,898	84
Septicæmia, pyæmia	511	487	411	80
Mouth and throat diseases	1487	1204	931	63
Ear and mastoid disease	1295	1189	928	72
Appendicitis	3027	2733	2038	67
Diseases of bladder, urethra	1322	1173	910	69
Puerperal and postabortive sepsis	682	649	523	77
Diseases of skin and subcutaneous tissues	1616	1345	1170	72
Totals .. Group A	3586	2266	2599	72
" B	37,749	32,431	27,883	74
All	41,335	34,697	30,482	74

1000 deaths, or 28% compared with 1938, but this takes no account of the saving of perhaps 2500 lives amongst the cerebrospinal fever cases. Group B, the diseases of more stable prevalence, recorded 26% decrease, erysipelas showing most improvement (59%), followed by lobar

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pneumonia (39), mouth and throat diseases (37), appendicitis (33), diseases of the bladder and urethra (31), ear diseases (28), skin conditions (28), maternal sepsis (23), septicæmia (20) and pneumonia not specified as lobar (16). Comparing these groups with other diseases, the increase or decrease in deaths from 1938 to 1939 and from 1938 to 1942 is summarised in table X:

TABLE X—DIFFERENCES IN MORTALITY, 1938–39 AND 1938–42

—	1938	1939	1942	1938 to 1939	1938 to 1942
"Sulphonamide" groups ..	41,335	34,697	30,482	− 6638	− 10,853
Tuberculosis and syphilis ..	29,002	28,933	28,483	− 69	− 519
Cancer	66,584	67,154	70,422	+ 570	+ 3838
Degenerative diseases, senility and nephritis	178,691	194,877	185,584	+ 16,186	+ 6893
Other diseases ..	140,653	149,276	134,022	+ 8623	− 6631
Total deaths from disease ..	456,265	474,937	448,993	+ 18,672	− 7272

It is quite possible that part or all of the 5% reduction for the group of "other diseases" may have resulted from the inclusion in it of many infective complications of these diseases, though in smaller proportion than in the selected group.

Though alternative explanations might be advanced, it seems to me reasonable to conclude from the figures, that the lives saved by sulphonamides in 1942 ran well into five figures, neutralising the increase in deaths since 1938 attributable to the rising population of old people and sensibly reducing the standardised death-rate.

SUMMARY

In 1942 the standardised death-rate for civilian females was 9% below that of any previous year, and for civilian males it was also the lowest recorded, notwithstanding the unfavourable effects of selective recruitment. When the death-rates of 1939 at separate ages were compared with those of 1938 a pronounced improvement for each age-group under 45, coupled with a deterioration for each higher age-group, was noticed. By 1942 the improvement had spread over the whole scale of ages above 1 year, which suggests that some ameliorative factor operated first upon younger people about 1939 and later upon older people also. Analysis of the deaths by cause shows that the bulk of the improvement in death-rates since 1938 has occurred amongst those diseases either directly affected by sulphonamides or else commonly fatal from infective complications likely to have been treated by those drugs.

Mortality of children aged 1–5 years from disease was halved between 1931–35 and 1939, an achievement which has not received the attention it deserves; and 1942 registered a further improvement. The diphtheria death-rate at ages under 15 in 1942 was the smallest ever recorded, being 14% better than the previous lowest figure. Tuberculosis deaths returned to about the level of 1938, and the same was true of peptic ulcer. The decline in diabetes deaths, which began about a year after food rationing was introduced, continued in 1942. Deaths attributed to coronary disease and angina pectoris continued to increase although degenerative circulatory diseases as a whole registered a considerable fall since 1939, notwithstanding the larger population at advanced ages. Rheumatic fever and exophthalmic goitre deaths continued to fall rapidly. Cancer shows no evidence of any important war-time trend when the changes in age constitution of the population are taken into account.

Non-civilian deaths registered in England and Wales are included in all totals of deaths unless otherwise stated. Deaths and rates by causes for years before 1940 have been corrected to the new method of classification in force from 1940 onwards. Details of deaths by sex and by quarter in which they were registered, for the causes in tables VI, VII and IX, and for other causes also, are given for years 1938–42 in the appendix tables of the *Registrar-General's Quarterly Returns* of 1941 onwards.

INFECTIVE HEPATITIS

300 CASES IN AN OUTER LONDON BOROUGH

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JAUNDICE of epidemic type is mentioned in *De internis affectionibus*, often ascribed to Hippocrates, and quoted by Cockayne (1912). It was recognised as contagious in the 8th century A.D. (correspondence between Pope Zacharias and St. Boniface). Cockayne differentiated between Weil's disease and "epidemic catarrhal jaundice," of which he gave an excellent description. Several outbreaks of the latter disease in this country have been investigated—e.g., Morgan and Brown (1927) Pickles (1930). In New York State 700 cases were reported by Williams (1923).

The 300 cases of infective hepatitis in Wembley now reported form part of a larger outbreak extending over surrounding districts. The only death among them was that of a boy aged 16, a pupil at a school in Wembley, who was admitted to hospital on March 24 in coma, and died on the 27th from hepatic failure. The autopsy showed acute yellow atrophy of the liver.

As sources of infection there has been no cause to suspect water or milk-supplies or foodstuffs, nor could the infection have been spread by rodents. With few exceptions, the patients all reported known close contact with other persons who either were suffering from the disease or had just recovered.

CLINICAL FEATURES

Most cases showed well-marked prodromal symptoms such as mental depression, irritability, or drowsiness, with loss of appetite, and constipation, often accompanied by headache (usually frontal or retrobulbar), with pain in the right epigastrium, sometimes diagnosed as acute appendicitis. Many patients complained of shivering attacks, and a few of muscular tenderness or photophobia. In only eight cases was there any coryza at the onset.

After 3 or 4 days, nausea and vomiting appeared and there was a rise of temperature, usually to about 101° F., but reaching 104° F. in one case. Bile appeared in the urine on the 5th or 6th day of the illness and was followed in 24–48 hours by jaundice. The jaundice commenced always in the ocular conjunctivæ, and often spread to the face, neck, abdomen, and indeed the whole body. As the illness is unaccompanied by any definite anæmia, the patient's cheeks frequently showed a peculiar orange tint. With the onset of the jaundice there was in most cases a remarkable improvement in the patient's general condition. The mental depression and drowsiness—and usually the vomiting—disappeared, and within a few days many of the patients had ravenous appetites. The stools were pale, described by the parents as grey or clay-coloured. Although most patients were constipated at the outset, a few complained of diarrhœa. In some cases the quantity of urine passed was considerably diminished, but with the appearance of the biliuria, there was a return to the normal volume. The liver was found to be moderately enlarged in each patient examined, but the spleen could not be felt. Many patients lost several pounds in weight.

It was found that in a mild case, after the initial symptoms of headache, nausea, and epigastric pain, bile would appear in the urine for a short time only, and that jaundice, even of the conjunctivæ, did not follow. It must be assumed that these patients are as infectious as those more severely attacked. Many did not consult a doctor, and called the illness a bilious attack.

The jaundice usually clears within one to three weeks, but in one patient it was still clearly visible 8 weeks after its first appearance. Several of the adults affected were more severely ill than is usual with children, the jaundice being deeper and the vomiting and prostration more evident; some of them sweated excessively and stained the bedclothes yellow, and three or four were confined to bed as long as 5 weeks. In a few cases the jaundice was associated with other diseases, including diphtheria, whooping-cough, and mumps. The only one developing a complication, however, was No. 14, described below.

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In only one case was there complaint of enlarged lymph glands: the patient, a boy of 6, had a swelling on the left side of the neck 14 days before the onset of jaundice, and an enlarged gland could be felt on the left side two months later. Joint pains or general aches were noted in 13 cases. Several of the adults said that they had had the disease as children; one man, aged 25, was able to recall an attack when he was 7.

The illustrative cases recorded below show the possibility of confusion in the prodromal stage with acute appendicitis, acute gastro-intestinal upset (including "gastric 'flu"), basal pneumonia, and meningitis. The more severe cases of jaundice must be distinguished from Weil's disease.

Most of the patients were under the care of private practitioners, and it was found that confinement to bed for a few days with restriction of fats, and as much increase of carbohydrates as possible in war-time, were effective measures. Calomel was a useful purgative.

ILLUSTRATIVE CASES

PRODROMAL STAGE

CASE 1.—Female aged 40. Onset with shivering attack which lasted three days accompanied by a moderate amount of pain of pneumonic type over the bases of both lungs, nausea and vomiting.

A child also commenced the illness with pneumonic pain.

CASE 2.—Male aged 7, subject to attacks of vomiting. Vomited each Friday for three weeks—Jan. 1, 8 and 15, 1943. Had diarrhœa from Jan. 8. Vomited again at school on the 18th, and was sent home. Bile appeared in the urine the same day.

Three children had mild delirium at the onset and the following patient showed a meningeal reaction.

CASE 3.—Male aged 10; has congenital pulmonary stenosis and mild post-scarlatinal nephrosis. Sudden onset on Jan. 17 with complete loss of appetite and rise of temperature. By the evening of the 18th the temperature was over 103° F. and the patient wanted to be left alone in a dark room. He complained of tinnitus and vertigo, headache and epigastric pain, and vomited. There was neck rigidity for 48 hours; the private medical attendant reported that he could raise the patient by his head from the bed. Bile appeared in the urine on the 21st and jaundice commenced on the 23rd, the patient at once feeling much better. Incidentally, the temperature continued to rise each evening until Feb. 17.

Four children, none of whom had ever previously fainted, commenced the illness with one or more simple faints (vasovagal attacks)

PRE-ICTERIC PRURITUS

This was well illustrated in three cases.

CASE 4.—Female aged 7. Itching of the skin of the abdomen from Jan. 22. Patient very miserable and irritable. Loss of appetite from Jan. 25. Jaundice appeared Jan. 29. The pruritus persisted for a further week.

CASE 5.—Female aged 14. Pruritus of the whole body from Feb. 1. Slight vomiting from the 8th. Dark urine from the 21st. Jaundice appeared on the 22nd. The pruritus persisted and was still present on March 9 after the jaundice had cleared.

CASE 6.—Male aged 5. Cousin of case 5, living in the same house. Absent from school with varicella followed by measles. Complained of itching of the skin of the whole body and depression from Feb. 28. Vomiting commenced on March 7 with a rise of temperature and abdominal pain. Dark urine from the 8th and jaundice from the 9th.

RASHES

Four children developed rashes of urticarial type at different stages of the illness.

CASE 7.—Male aged 8. Typical lesions of papular urticaria on Feb. 1. On the 22nd he had a rise of temperature with epigastric pain followed later by vomiting. His urine was dark on the 26th and the developing icterus was first noticed by the private doctor on the same day.

CASE 8.—Female aged 9. Severe bilious attack Dec. 11–13, 1942. Returned to school on the 14th. On Christmas Day the urine was seen to be dark, and the patient presented the following alarming appearance: She was "blood-red colour all over," with large weals in the flexures and dependent parts. Later the same day she complained of itching of the palms and soles. The urine was stated to be red. The eruption disappeared within two days and jaundice appeared on Dec. 29.

CASE 9.—Male aged 8. Developed typical lesions of papular urticaria all over his face and both deltoids while jaundice was present. The lesions reached a maximum within a few hours, lasted 3–4 hours and faded the same day. They reappeared four days later, following the same course.

CASE 10.—Male aged 8. Whooping-cough from Jan. 7. On the 15th he complained of epigastric pain and nausea. Jaundice appeared on the 22nd. While the jaundice was present, the cough disappeared, but it returned as the jaundice cleared. When last seen on March 3 he had typical papular urticaria which first appeared about 14 days after the jaundice faded. Incidentally, this patient's brother, aged 4½ years, who developed whooping-cough at the same time as he, failed to contract the hepatitis.

INSTITUTIONAL CASES

These are reported as showing several features of interest.

CASE 11.—Male aged 10; complained of lassitude from Oct. 1, 1942, constipation from the 8th, and abdominal pain from the 13th. When examined on the 15th his temperature was 98·8° F., pulse 98. He was very prostrated, drowsy and listless. There was no rash. There was very slight icterus of the conjunctivæ. The tongue had a thick white fur. The abdomen was a little scaphoid, soft and not tender. The pain was localised in the left iliac fossa. While being examined, the patient vomited about 10 oz. of clear watery fluid. He was transferred to hospital as a possible case of typhoid fever. On admission the temperature was 100°; pulse 64, physical examination negative. The same evening the pulse had fallen to 52 and the liver was found to be enlarged below the costal margin. Jaundice appeared on Oct. 18, and he made an uneventful recovery.

CASE 12.—Male aged 6; was admitted on Oct. 28, 1942, to the local isolation hospital suffering from diphtheria, which followed a normal course until Nov. 27, when he developed a number of septic spots on the back and arms. On Dec. 3 he was noticed to be very flushed, but did not complain. The following day he complained of nausea and vomited a large amount of undigested food. On the 5th he vomited several times and on the 6th the conjunctivæ were noticed to be tinged with yellow. During the same day the skin of the whole body became jaundiced. There was only a very slight rise of temperature throughout the attack. There had been no previous case of hepatitis in this hospital nor have any since occurred either among the patients or the staff.

CASE 13.—Female aged 10. First complained of abdominal pain and considerable flatulence on Nov. 16, 1942. The pain recurred on and off for a week. The appetite disappeared on the 20th; right-sided epigastric pain appeared on the 21st, and vomiting on the 22nd. She was admitted to hospital on the 23rd with a tentative diagnosis of acute appendicitis. There had been absolute constipation for two days.

On admission: throat clear, tongue coated, tenderness in the right iliac fossa, no rigidity. Fæces palpable in the iliac colon. Shotty glands felt in all areas of abdomen. Chest clear. Rough mitral first sound, systolic murmur at apex. No history of previous similar attacks of pain. Nov. 24: no further vomiting; constipation persists. Nov. 25: total white-cell count 3100 (polymorphonuclears 28%, lymphocytes 70%, monocytes 2%).

Exploratory laparotomy was performed under general anæsthesia on Nov. 26. Battle's incision. Free fluid + +. Multiple enlarged mesenteric glands, some calcified and some caseous. Part of caseating gland removed for biopsy. Long retrocæcal healthy appendix removed. The biopsy report read: "healed caseating tuberculosis, no evidence of recent spread."

On Dec. 1 the patient became jaundiced, with dark urine. The stools were normal in colour. There was no tenderness over the gall-bladder. By Dec. 10 the jaundice and pain had gone, and the bowels were functioning normally. A Mantoux test was positive at 1 in 100, negative 1 in 1000. The patient was discharged from hospital on Dec. 23 feeling well. Incidentally, her twin brother, with whom she had no contact after her admission to hospital on Nov. 23, developed jaundice at home on Dec. 1. No further cases occurred in the ward.

During the 5 months October, 1942, to February, 1943, four further patients were admitted to the same general

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hospital, as cases of acute appendicitis, in whom the final diagnosis was infective hepatitis. The above (case 13) was the only patient submitted to operation.

CASE 14.—A medical specialist who fell a victim has kindly described his symptoms and experiences. He was taken suddenly ill on Jan. 10, when he felt cold and shivery all day. During the night he had a very heavy sweat, and his temperature was found to be slightly raised next morning. By lunch-time it was down to normal, so he left his bed and returned to his clinic. That night and the next he again sweated, but was able to do his morning clinics. His appetite remained good, but slight cough was present. By the 13th, however, he felt really ill, and his evening temperature was 101·6°.

The next day his appetite disappeared, his stomach "felt like a lump of lead" inside him, and he was tender in the epigastrium. The tongue was heavily coated, and he vomited once or twice. He was really ill for a few days and became jaundiced on the 19th. The urine had been very dark and the stools pale for a couple of days before. He soon began to improve, and by the 25th his temperature had fallen to normal and his appetite began to return. The jaundice slowly subsided, and the liver, which had been slightly enlarged and tender, receded beneath the costal margin.

On the evening of Jan. 31, however, he started shivering; his temperature rose, he sweated copiously and started to cough. Two evenings later he had another shivering attack, with a slight temperature and a heavy sweat, and during the night his temperature dropped 7°. His cough had become very severe, and he brought up about 1 oz. of purulent sputum a day. On Feb. 5, and for the four following days, the sputum was flecked with blood. He had been admitted to hospital on Feb. 3, and quickly recovered. The sputum was negative. Radiography of the chest was very streaky at first and indicative of bronchiolitis, but improved after a week in hospital. By Feb. 20 he felt fairly well but easily fatigued.

EPIDEMIOLOGY

The first intimation of the outbreak was on Oct. 15, 1942, when a private practitioner requested help in the diagnosis of case 11, living on the extreme southern borders of the borough. It was ascertained that 10 other cases had occurred in the same district. Since that time, the local medical profession has assisted by informing the public health department of cases of jaundice as they have arisen.

In the middle of November there was a sharp rise in the incidence, falling in the main on two schools in the east and north-east of the borough. In one of these schools, which has 778 children on the register, 78 known cases have occurred among the pupils, and 2 of the staff have also been affected. In one class of children aged 8, with 44 on the register, 8 children and the teacher fell victims. No explanation can be offered as to why this school was singled out for such a heavy attack. It was found that the maximum incidence was in the artisan districts, although scattered cases appeared in the rest of the borough.

The first 250 cases have been considered in some detail.

Sex-incidence.—Of 250 cases, 144 were males, 106 females.

Age-incidence.—This is indicated in table I: 80·3% were under the age of 15, and 89·4% under the age of 24 years.

TABLE I—AGE-INCIDENCE

0– 5 years	8	10–15 years	82
5–10 years	116	Over 15 years	44

Seasonal distribution.—There used to be a saying in France "Il y a des mois où il pleut de la bile à Paris." Of the 250 cases analysed, the dates of onset of 203 cases were between Dec. 1, 1942, and Feb. 28, 1943, and of these 102 began the illness in the month of January. Although there has been a decline in the incidence, cases were still being reported up to the middle of April at an average rate of 9 a week.

Multiple cases in households.—85 (34%) were multiple—i.e., there was more than one case in a household. The maximum number of cases in a home was seven. In 165 instances there was only one in a house, in 28 instances there were two, in 2 instances there were three, in 4 instances four, and in 1 instance seven. The attack-rate for the 200 families affected is shown in table II.

TABLE II—ATTACK-RATE

Age	0–5	5–10	10–15	Over 15	Total
Exposed in household	73	72	66	435	646
Clinically infected	2	20	18	8	48
	(2·7%)	(27·8%)	(27·3%)	(1·8%)	(7·4%)

Infectivity.—Both home and school contact could be blamed for the spread of infection, but it appears that close contact is required. The attack-rate in the houses involved is shown in table II. These figures are considerably lower than those for rural districts given by Newman (1942).

Although many instances of parallel infection were found, nevertheless the serial incidence, as noted by Pickles (1939), was well-marked.

As a contrast to the above, in one remarkable family, where 2 adults and their 8 children share a bedroom (of choice, not necessity), and where one child—a girl of 10—was a victim, no further cases have occurred. Further,

TABLE III—HOME CONTACTS, INDICATING PROBABLE INCUBATION PERIOD

Age	Sex	Date of onset of illness	Probable incubation period (days)
9	M	Sept. 28	..
13	F	Oct. 27	29
9	M	Dec. 18	..
13	F	Jan. 1	14
18	F	,, 26	25
40	F	Feb. 6	36
7	F	Jan. 4	..
11	M	Feb. 1	28
8	F	Jan. 8	..
35	M	Feb. 3	26
12	F	Jan. 11	..
25	M	Feb. 10	30

of the 44 patients over the age of 15 years, 18 were married persons (11 wives and 7 husbands) whose respective spouses were living at home. In no case were both husband and wife affected.

There were 5 pairs of twins in the series. In 2 instances both twins fell victims on, or about, the same day. In the other 3, only one twin was affected.

Incubation period.—The difficulties of determining the probable incubation period in an urban community are well known, but in several instances where members of the same family, or the same school class, were affected

TABLE IV—SCHOOL CONTACTS, INDICATING PROBABLE INCUBATION PERIOD

School	—	Last attendance at school	Date of onset of illness	Probable incubation period (days)
A	Class of boys age 12	Oct. 15	Oct. 15	..
		Nov. 13	Nov. 13	28
		Dec. 18	Dec. 15	30
		Jan. 7	Jan. 7	20
		,, 14	,, 11	24
B	Class of girls age 9–10	Dec. 23	Jan. 2	..
		Jan. 22	,, 25	33
				(There was no contact between these two girls between 23/12/42 and 18/1/43)
C	Boys of 8 years	Nov. 18	Nov. 15	..
		Dec. 22	Dec. 18	30
		Jan. 12	Jan. 13	22
C	Mixed class age 7–8	Dec. 18 (teacher)	Dec. 16	..
		Jan. 15	Jan. 8	21
		,, 8	,, 8	21
		,, 13	,, 14	27
		,, 20	,, 14	27
		Dec. 23	,, 15	28
		Jan. 24	,, 24	37
		Feb. 26	Feb. 19	26
C	Mixed class age 5–6	Jan. 13	Jan. 1	..
		Feb. 10	Feb. 11	29

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there was an interval of 14 to 37 days between the onset of the first symptoms in successive cases. In case 12 the incubation period appears to have been a minimum of 36 days.

Table III gives examples of home contacts. The last pair of cases was remarkable in that the girl of 12 lived with her parents in an upstairs flat, and the man of 25 with his wife and child in the downstairs flat; and the two patients had very little, if any, contact with one another.

Table IV shows some examples of cross-infection in schools. Each of the children quoted was either the first case, or the only case, in a household.

Mode of spread.—It is probable that the infection is spread by droplets, but this so far has not been proved, and the spread of infection may well be fæcal contamination conveyed by the fingers.

Method of control.—It is suggested that, in the case of the schools most seriously affected, a child who vomits in school should be sent home for seven days, and that if at the end of that time jaundice has not developed he may return to school.

SUMMARY

In Wembley there were 300 cases of infective hepatitis within 9½ months, with one death. The first 250 cases have been analysed.

The prodromal symptoms are very various, and cases are described showing pre-icteric pruritus, urticarial rashes, a meningeal reaction, and other manifestations.

As the infective agent has not yet been isolated, and as it appears that the incubation period is long, the only suggestion put forward for the control of the infection is that, during an epidemic, children who vomit in school should be excluded for seven days.

I am grateful to Dr. A. G. Morison, medical officer of health for Wembley, for his advice and encouragement, and to the many colleagues who have assisted by supplying much of the information here presented.

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JAUNDICE FOLLOWING YELLOW-FEVER IMMUNISATION

TRANSMISSION BY INTRANASAL INSTILLATION

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IN 1937 Findlay and MacCallum drew attention to the occurrence of jaundice following yellow-fever immunisation, cases of which they had been investigating since 1934. The condition was seen in England, the Anglo-Egyptian Sudan and West Africa. In 1938 Soper and Smith reported a similar occurrence in Brazil.

In subsequent communications (Findlay and MacCallum 1938; Findlay, MacCallum and Murgatroyd 1939) evidence was brought forward to show that the jaundice following yellow-fever immunisation had nothing whatever to do with the yellow-fever virus as such, but was probably due to some agent in the human serum used in the preparation of the vaccine. It was considered possible that this icterogenic agent had multiplied, together with the virus of yellow fever, in a serum-Tyrode culture medium containing minced chick embryo, and it was certain that the agent had passed through a Seitz filter-pad. When the technique of preparing the vaccine was altered by employing only serum taken from donors who had remained in perfect health for a month or more after the serum had been withdrawn, and by inactivating the serum for at least 30 minutes at 56° C., it was found that no further cases of post-inoculation jaundice occurred in the many thousands of persons immunised in England and Africa from November, 1937, onwards. Similar precautions taken in Brazil also resulted in the elimination of jaundice as a sequel to yellow-fever immunisation.

After more than a million people had been inoculated in Brazil jaundice reappeared again in October, 1939, in about 27% of a group of 304 persons, all inoculated, some four months previously, by Fox et al. (1942) with one lot of vaccine. In May, 1940, in South America more cases appeared in relation to a small number of different lots of vaccine. Out of approximately 107,000 people injected with the incriminated batches 1072 became icteric after an incubation period of 12 to 20 weeks. In all these instances the possibility that the serum was not inactivated for sufficient time was not, apparently, excluded.

Recently jaundice has been reported among American army personnel inoculated with yellow-fever vaccine: 28,585 persons are stated to have developed jaundice and 62 of them have died (*Journal of the American Medical Association* 1942).

Findlay and MacCallum (1938) suggested that jaundice following yellow-fever inoculation was due to a virus in the serum obtained from apparently healthy persons who were in reality suffering from subclinical or very mild infective hepatitis and introduced into the tissue-culture flasks of the yellow-fever virus used as vaccine. In the cases described by them the clinical symptoms were identical with those of infective hepatitis and the pathological changes in one fatal case (Findlay, MacCallum and Murgatroyd 1939) were consistent with infective hepatitis.

Two differences were, however, noted from ordinary infective hepatitis—namely, the length of the incubation period and the fact that cases of post-inoculation jaundice have not given rise to epidemics of infective hepatitis.

The prolonged incubation period, sometimes up to 120 days, is not inconsistent with a virus ætiology, since in many virus infections if the virus is inoculated by an abnormal route or in very small doses the incubation period may be greatly increased. Considerable evidence goes to show that infective hepatitis is a droplet infection and is not normally acquired by subcutaneous injection. It is difficult to see how a toxic agent in serum could become active only after an interval of 120 days unless it multiplied in the body: an explanation alleging an allergic phenomenon is also not easy to sustain.

The failure of patients with post-inoculation jaundice to set up an epidemic is more difficult to explain. The persons inoculated by Findlay and his colleagues, however, were scattered in ones and twos throughout West Africa and any case of infection from them would have been difficult to determine. Where whole populations or whole military units are inoculated with icterogenic vaccine it is possible that those who do not develop jaundice may nevertheless receive an immunising injection.

It will be recalled that jaundice has also followed the injection both in children and adults of pooled serum taken from measles convalescents and adults (MacNalty 1938). In an institution where 7 children developed jaundice after an inoculation of measles convalescent serum 2 other uninoculated children who had been in contact with the jaundiced children developed jaundice two months later (Propert 1938). The incubation period after the injection of the measles immune serum varied from 2 to 16 weeks.

Within the last few months an opportunity of investigating a number of the problems raised by post-inoculation jaundice has presented itself, since between 250 and 300 cases of jaundice have again been seen following yellow-fever immunisation. A full account of these cases will be published in due course, but in the meantime it may be said that the symptoms have been identical with those previously noted by Findlay et al. (1937–1939) in the cases of post-inoculation jaundice and with those of infective hepatitis. Joint pains have been absent while urticaria—or, to be precise, erythema multiforme—has been seen in approximately only 3%. The incubation period, however, has never been shorter than 62 days. The reason why in certain outbreaks of post-inoculation jaundice skin rashes and joint involvement are common while in others they are rare is not at the moment possible to explain. On a virus ætiology the action of slightly different strains might be postulated.

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In the present communication evidence is brought forward to show that an infective icterogenic agent is present in the nasopharynx of patients suffering from jaundice following yellow-fever vaccine infection.

EXPERIMENTAL TRANSMISSION TO HUMAN VOLUNTEERS

All attempts to transmit the disease to the usual laboratory animals, guineapigs, mice, rats, rabbits and two horses, in addition to baboons, cercopithecus, cercocebus and colobus monkeys again failed; it was therefore determined to investigate the possibility of transmission to human volunteers.

Four adult males placed themselves at our disposal as volunteers. As far as they knew they had never suffered from jaundice. All were immune to yellow fever and had been immunised some eight months previously from a batch of vaccine that had not produced jaundice in any person into whom it had been inoculated. The volunteers were living and had lived for the past year in a semi-closed community in which no case of infective hepatitis had occurred for the previous ten months. They were located some miles from the nearest town which they rarely, if ever, visited, while careful inquiry in the villages in their immediate neighbourhood failed during the six months before the initiation of the experiments, and during what must be regarded as the period of "incubation" of the disease in the volunteers, to reveal any cases of jaundice.

It thus appears not unreasonable to assume that if jaundice was not seen in the semi-closed community of approximately 500 persons except in the volunteers, the jaundice in the volunteers was due to the experimental inoculation and not to chance.

The method of obtaining washings from the nasopharynx of patients with icteric or preicteric symptoms following yellow-fever inoculation was as follows:

With the head thrown well back a total of 10 c.cm. of sterile physiological saline was instilled with a Pasteur pipette in small amounts into the nostrils. After retaining the saline for ½–1 min. the patient spat into a sterile petri dish. The washings were then collected in a sterile test-tube, placed in a thermos flask and taken for inoculation into the volunteers who were some miles distant from the donors and thus never came in direct contact with them. The interval between the removal of the nasal washings and their instillation into the volunteers was not more than one hour.

For instillation into the nares the volunteers were placed flat on a couch with the head hanging over one end. The nasal washings were then slowly dropped into the nostrils of the volunteers who were told to sniff. The whole process took about 10 min. and for a further 5 min. each volunteer remained supine with his head thrown back.

Each volunteer had his temperature taken regularly and was seen frequently. Every week the icteric index of his serum was determined, his urine was examined for bile and albumin and a differential leucocyte-count was carried out. The volunteers were asked to report if they felt unwell, but no volunteer had any but the most general knowledge of what, if any, symptoms he might develop or at what time he might be expected to develop them.

ILLNESS OF THE DONORS

Before describing the findings in the 4 volunteers it is necessary to give brief clinical notes on the 4 donors of nasal washings:

(1) LIEUT. A., inoculated against yellow fever Oct. 20, 1942, first felt unwell 80 days later, on Jan. 8, 1943; he complained of feeling tired with general malaise, loss of appetite and slight nausea. No nasal catarrh was present and there were at no time urticaria or joint pains. On Jan. 9 the symptoms were similar: slightly febrile in the evening; no jaundice of the skin. No bile in the urine. Total leucocytes 10,000 per c.mm.: polymorphonuclears 60%, lymphocytes 32%, mononuclears 6%, eosinophils 2%. Nasal washings were taken for instillation into Recipient T. P. Jan. 10: conjunctivæ showed a very faint icteric tinge but no bile or albumin was present in the urine. Jan. 13: the conjunctivæ were now definitely yellow and there was a faint icteric tint on the skin; the urine contained neither bile nor albumin. On the 15th and 16th he felt better but jaundice was deeper and both bile and albumin were present in the urine: constipated throughout and stools slightly lighter than normal but never putty-coloured. No abdominal pain and no enlargement of the liver or spleen. Condition gradually improved and by Jan. 25 there was only a faint icteric tinge in the conjunctiva and a trace of bile in the urine: albumin was no longer present. On Feb. 3 he was discharged: no bile in urine and no jaundice of the skin or conjunctiva.

(2) LIEUT. B. was inoculated against yellow fever on Oct. 20, 1942. On Jan. 9, 1943, 81 days later, he developed diarrhœa in the morning and had approximately one stool every hour till the evening when the diarrhœa ceased; the stools were brown and contained neither blood nor mucus: he felt tired at night and had a slight headache which lasted two days. During the next three days there was a tired feeling and some discomfort in the upper part of the abdomen. On Jan. 12 nasal washings were removed and instilled into Recipient J. D. At this time there was no jaundice of the skin or conjunctiva but the urine was "copper-coloured" and contained bile. Temperature in the evening 100·2° F. For four days the appetite had been poor and there was a feeling of nausea whenever he took food; no actual vomiting.

On Jan. 13 the conjunctivæ were jaundiced; no enlargement of liver or spleen but some tenderness immediately below the right costal margin. The urine contained bile and a trace of albumin; no urticaria was present at any time nor were there joint pains. Leucocytes 4300 per c.mm. Polymorphonuclears 49%, small lymphocytes 47·5%, mononuclears 2%, eosinophils 1·5%. On Jan. 15 jaundice was still evident in the conjunctiva and to a slight extent in the skin. Bile in the urine but no albumin. Liver just palpable below the right costal margin; spleen not palpable or tender. Constipated; stools light grey. By the 17th jaundice was fading; he felt much better and appetite has improved. Discharged on Jan. 25; no jaundice of skin or conjunctiva and no bile or albumin in the urine.

(3) CAPT. C. inoculated against yellow fever Oct. 20, 1942; felt off colour, with poor appetite, nausea and general malaise, on Jan. 11, 1943, 83 days after inoculation. These symptoms continued and on Jan. 14 the urine was dark though neither skin nor conjunctivæ were tinged. Jan. 17: jaundice of skin and conjunctivæ; appetite very poor; constipated. Jan. 18: jaundice more marked; urine contains bile but no albumin; liver and spleen not enlarged; stools pale and pasty. Nasal washings were taken for instillation into Recipient M. M. Jan. 20: total leucocytes 5000 per c.mm.; polymorphonuclears 49%, small lymphocytes 40%, mononuclears 9%, eosinophils 2%

Jan 22: bradycardia. Jan. 26: appetite still very poor and feeling very nauseated; skin and conjunctivæ deep orange. Jan. 31: jaundice rapidly fading; feels better. Feb. 4: urine now free from bile but bradycardia and jaundice still present. Feb. 11: only a faint icteric tinge in the skin; pulse-rate normal; feels fit. Feb. 15: discharged. No skin rash and no joint pains were noted at any time.

(4) LIEUT. D. was inoculated against yellow fever on Oct. 20, 1942. Belongs to same unit as two previous patients. Admitted to hospital Jan. 4, 1943, with slight pyrexia, diarrhœa and vomiting; diarrhœa continued for six days but no pathogenic bacteria or protozoa were found in the fæces. No bile in the urine and no evidence of jaundice in the skin or conjunctiva; no urticaria or joint pains. Nasal washing removed for instillation into Recipient A. Y. on Jan. 10, in the hope that the donor was then in the preicteric stage.

The three first patients were all mild cases of post-inoculation jaundice and in no way differed from those seen previously by one of us or from cases of infective hepatitis. Lieut. D. on the other hand differed in his symptomatology from the other Europeans in his unit who developed jaundice. There is thus considerable evidence in favour of the view that he did not suffer from jaundice as a result of his yellow-fever inoculation.

ILLNESS OF THE RECIPIENTS

The effects following the nasal instillation of the four volunteers with nasal washings from the four patients now require consideration.

(1) T. P.—Received 10 c.cm. of nasal washings from Lieut. A., instilled into the nostrils on Jan. 9. No symptoms till Feb. 8 when he complained of feeling tired and of pains in the upper part of the abdomen, and a feeling of nausea. Temp., 100° F.; the lower edge of the liver just palpable and

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the spleen one finger-breadth below the left costal margin. The conjunctivæ showed no trace of icterus : the temperature in the morning was 99° F., rising to 100·2° in the evening, the highest temperature recorded. Constipation was present and the stools were light grey in colour.

On Feb. 8, 30 days after inoculation, there was no albumin in the urine and no bile. The serum icteric index was 6 ; the icteric index having not previously exceeded 4. On Feb. 11 the icteric index was 8, the van den Bergh reaction gave a delayed direct positive ; a trace of albumin was present in the urine and a urobilin (spectroscopic determination) and bile were also found. Differential leucocyte-counts showed no significant change but the initial differential count on Jan. 9 showed 48% of small lymphocytes. On March 12 the urine contained a faint trace of albumin, but no bile and no urobilinogen.

(2) J. D.—Inoculated intranasally with 10 c.cm. of nasal washings from Lieut. B. on Jan. 12 ; no symptoms till March 3, 50 days after the experimental inoculation, when he complained of "belly palaver" ; he was constipated and there was some tenderness over the upper part of the abdomen but no enlargement of the liver or spleen. These symptoms continued till March 9, the temperature having been raised on the evenings of March 7 and 8 between 99° and 100° F. On examination on March 9 the conjunctivæ were a pale lemon-yellow, the tongue was clean and the only symptoms were referred to the upper abdomen. The bowels had not been open for 4 days. The urine was dark orange. On March 7 the urine contained a trace of urobilin but no bile and no albumin ; the icteric index of the serum was 3·5. March 9 : urine, albumin +, bile and urobilin present. On March 10 bile was strongly positive in the urine, urobilin and albumin also present. The serum icteric test was 20 and the van den Bergh gave a positive direct reaction. March 14 : bile and urobilin in urine ; no albumin ; icteric index of serum 18 ; van den Bergh positive delayed direct reaction. On Jan. 12, the differential leucocyte-count had been polymorphonuclears 49%, small lymphocytes 34%, mononuclears 7% ; on March 7 it was polymorphonuclears 40%, small lymphocytes 58%, mononuclears 2%, and on March 10, polymorphonuclears 34%, small lymphocytes 63%, mononuclears 3%. On March 14 the percentage of small lymphocytes was 50.

(3) M. M.—Inoculated intranasally with 10 c.cm. of nasal washings from Capt. C. on Jan. 18. No symptoms of any sort till Feb. 15—i.e., 28 days later—when he complained of general malaise, tiredness and loss of appetite. His temperature in the evening was 99·2° F. Urine contained no abnormal constituents. No van den Bergh reaction in serum. Feb. 17 : urobilin and a trace of bile in the urine while the blood-serum now gave a weakly positive direct reaction ; general symptoms improved ; no trace of jaundice in the conjunctivæ. March 2 : nothing abnormal in urine ; feels quite well.

(4) A. Y.—Inoculated intranasally on Jan. 10 with nasal washings from Lieut. D. in whom no symptoms or signs of icterus had been noted. On March 7 there was a trace of albumin in the urine but no bile and only a minute trace of urobilin in the urine. The icteric index of the serum was 2·5. On March 11 the urine showed no albumin and no bile and no urobilin. The icteric index of the serum was 3·5.

All spectroscopic analyses of urines were controlled against urines of normal persons on the same diet.

Of the 4 volunteers one, A. Y., has shown no evidence of illness. There is considerable doubt whether the patient with whose nasal washings he was inoculated ever suffered from post-inoculation jaundice. Of the three others, M. M. had subclinical icterus associated with mild symptoms ; the patient from whom he was inoculated had had bile in the urine for 4 or 5 days. T. P. and J. D., however, suffered from definite jaundice and the latter had a comparatively severe attack. The clinical symptoms in these two cases were identical with those of infective hepatitis, while the symptoms of M. M. may be compared with some subclinical attacks of infective hepatitis.

The findings in these three experimentally produced cases are very similar to those recorded by Voegt (1942) after feeding volunteers with duodenal juice and injecting serum from patients in the preicteric stage of infective hepatitis : the shortest incubation was 28 days. In this connexion it is interesting to recall that Findlay, Dunlop and Brown (1931) recorded what there is every reason to think was a spontaneous infection of a laboratory worker with infective hepatitis. The incubation period in this case was not less than 34 and not more than 41 days.

DISCUSSION

The results so far obtained with jaundice following yellow-fever immunisation show that in the nasal washings from patients in the preicteric and possibly icteric stage there exists an agent which is capable of inducing jaundice in human volunteers with symptoms similar to those of infective hepatitis, after an incubation period varying from 30 to 50 days.

The events recorded by Propert (1938) in relation to the possible infectivity of the jaundice following injection of measles immune serum thus receive some degree of confirmation since it is shown that yellow-fever post-inoculation jaundice is potentially infective by the intranasal route. In addition further evidence that this post-inoculation jaundice is infective is forth-coming ; for in a unit where a large number of the British personnel have suffered from jaundice following yellow-fever inoculation, a condition in every way simulating infective hepatitis has been seen in African personnel within a period which would have allowed of its transmission from Europeans to Africans.

Besides jaundice following injection of yellow-fever vaccine prepared with human serum, and also injection of measles immune serum, jaundice following transfusion with human blood and jaundice following injection of mumps convalescent plasma have now been recognised (Ministry of Health 1943). Thus the agent responsible for the jaundice is obviously present in serum as well as (the present observations suggest) in nasal washings. The presence of an infective icterogenic agent in nasal washings is suggestive of a virus rather than of a hypothetical toxin. Further investigations are in progress.

CONCLUSION

Nasal washings in physiological saline taken from three patients in the preicteric or early icteric stages of jaundice following yellow-fever immunisation and instilled into the nares of three volunteers have produced jaundice after incubation periods of 28, 30 and 50 days. There was a considerable variation in severity but the symptoms were similar to those of infective hepatitis.

Our thanks are due to Brigadier R. A. Hepple for his interest in these investigations, while to the volunteers who so readily came forward we must render our admiration and our thanks.

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A CHANCE TO GO TO BED.—The joint war organisation of the Red Cross and St. John Ambulance has maintained, since March, 1941, a sick-bay at 25, Cadogan Square for the nursing of civil-defence workers, men and women, and Red Cross and St. John personnel. The 26 beds are intended for those who though not ill enough to go to hospital would in normal times need nursing at home for a few days. Cases of influenza, acute bronchitis, minor accidents, jaundice, and over-strain have been admitted as well as patients discharged from hospital after an operation. A trained nurse is in charge, helped by several Red Cross workers. Patients may be attended by their own doctor, but there are two doctors attached to the sick-bay. So far 550 cases have been admitted. Dame Barrie Lambert, the present chairman, wishes to draw the attention of general practitioners in London to the advantages the sick-bay offers to people who may otherwise have no chance to go to bed for a few days when they are ill. Any doctor who wishes to see what care the sick-bay offers will be welcome as a visitor.

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TREATMENT OF IMMERSION FOOT BY DRY COOLING

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Webster and his colleagues (1942) treated cases of immersion foot in the hyperæmic stage by dry cooling. Cooling was achieved in one of three ways: (*a*) dry ice-bags were placed round each foot and changed every 4 hours or oftener if necessary, to reduce skin temperature by about 6° C.; (*b*) the feet were fanned with air cooled by cold water sprayed from a nebuliser; (*c*) the feet were exposed to room temperature in a cool ward. Pains were relieved, and within 4 hours patients were comfortable. Œdema usually subsided rapidly and contents of blebs were absorbed. In several cases impending gangrene was arrested. Too early removal of the ice-bags was followed by increasing œdema and even extravasation of blood. These Canadian workers mentioned an apparatus under construction for maintaining uniform dry cold. Later Greene (1942) described a "therapeutic refrigerator," remarking that he had no opportunity of trying it. The cabinet consists of an upper and lower compartment. The upper contains a tray for solid carbon dioxide. The lower has padded apertures for hands or feet. It contains a thermometer which registers at the back of the cabinet. Air circulates through two flues between the compartments. By opening and closing these flues the temperature of the lower compartment can be decreased or increased.

Since a previous report (Ungley and Blackwood 1942) an opportunity has arisen to try out methods of dry cooling in immersion foot in the hyperæmic stage.

Two men, A and B, after exposure for 34 hours on a raft in the North Sea were rescued on Jan. 5, 1943, reaching hospital a few hours later. The feet were cold, blue and moderately swollen. During the night the feet became hot (32°–34·5° C.) and more swollen. With the legs horizontal the feet were slightly red; dependent, they became congested to a deeper colour with a slight bluish tinge; elevated, they blanched rapidly. Peripheral arteries pulsated strongly. Power was deficient in the toes and electrical reactions were somewhat impaired in distally innervated muscles. Sensory loss to light touch (cotton-wool) and pain (pinprick) was chiefly confined to plantar surfaces of toes, distal soles and heels, lateral margin of feet, malleoli and dorsum of some toes. Sweat tests (Guttmann 1940) showed anhidrosis over plantar surfaces and margins of feet and dorsum of toes. Vasomotor responses to immersion of arms in hot, cold and hot water were absent in both feet of A and deficient in the right foot of B.

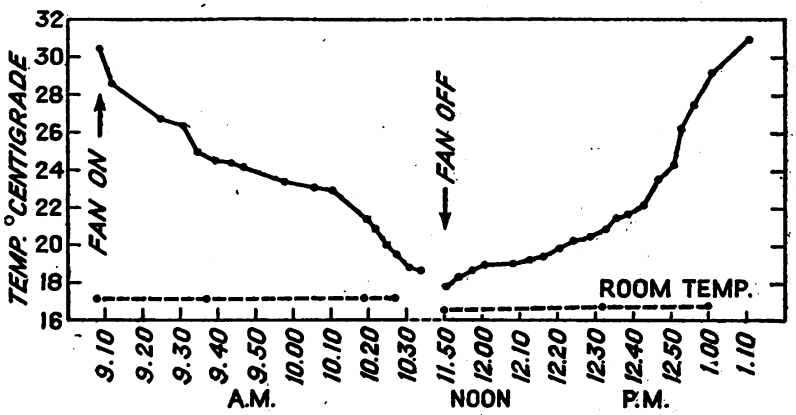
CASE A.—The skin vessels of the hot toes showed sensitisation to adrenaline (outflow invoked by insulin hypoglycæmia) such as follows sympathectomy. For the first 7 days A had no paræsthesiæ or pains. On the 8th day he awoke with pins and needles of slipper distribution in both feet, and stabbing pains made worse by coughing. He also complained of an indescribable pain which surged through his feet. During the next few days pains were more intense, calling for repeated doses of morphia. On and after the 15th day attempts were made to relieve pain by cooling the feet by means of a therapeutic refrigerator.

The refrigerator was constructed on the lines described by Greene, but made from wood instead of metal and not specially insulated. With the refrigerator standing at a room temperature of 12° C., solid CO_2 was placed in the upper chamber, the flues were opened and the apertures for the feet sealed. The temperature in the lower chamber fell in the next 40 min. to 3° C. and then remained fairly constant. However, when the refrigerator was transferred to a room with a temperature of 18°–19° C. and the patient's hot feet were placed inside, the temperature in the lower chamber soon rose to 12° C. and was not reduced, even when a further 10 lb. of solid CO_2 were added to the top compartment. During the first 75 min. that the feet were in the refrigerator the left great toe, to which a thermocouple was attached, cooled from 30° C. to 24° C., and remained at or just below this level. From 10 PM, after morphia gr. ¼, the patient was asleep. Room temperature fell during the night to 15° C. at 5 AM, rising to 16·5° C. at 8 AM. Though there appeared to be no lack of solid CO_2 in the upper chamber, and the flues were wide open, the temperature within the lower chamber had risen to 15° C. at 10.35 PM and to 18° C. by the next morning at 8 AM. At the same times the left great toe had warmed to 25·5° C. and ultimately to 27·5° C. Pains were less frequent and less severe than on the previous night, but the patient suffered considerable discomfort, because being "in stocks" as it were he was unable to move his legs. On the morning of the 16th day when the feet were removed from the box the toes warmed up to 30° C. and pains increased.

Comment.—Efficient cooling of the feet could no doubt be maintained by such a cooling cabinet if its walls were suitably insulated; however, in view of the discomfort resulting from restriction of leg movements we tried other methods. On the 16th day cooling of the feet by means of an electric fan was begun.

The patient was transferred to a cabin with a temperature of 16° C., covered with blankets except for his feet. Exposed thus for an hour, the feet remained hot (great toes 31°–32° C.). Pains were severe and the feet often twitched. An electric fan at full speed 12 in. from the soles cooled the toes in 2 min. to 23·7° C., and in 80 min. to 18·6° C. and 20° C. During the next 3 hours, with the fan at reduced speed and at a greater distance, the temperature of the great toes was maintained in the region of 17° C. and the dorsum of the feet at 22°–25° C. Within 5 min. of starting the fan pins and needles and pain had ceased. The patient remarked that his feet no longer felt stiff and he could move ankles and toes more easily. When asleep his expression was no longer pained and his feet did not twitch. Hyperæsthesia to pressure on the feet was less extensive and less severe now that the feet were cool. During the night the feet became uncomfortably cold, so that he drew them up under the blankets; here they became warm and pains recommenced. He went on alternately putting his feet out of, and under, the blankets until 4 AM, when he asked for the fan to be turned off. For some time the feet remained cold and free from pain, but as they warmed up soreness reappeared. On the 17th day the observations for the previous day were repeated. As before, pain and tingling were relieved by cooling the feet. The figure illustrates the rate of cooling and the way in which the temperature rose, at first gradually, and then steeply after the fan had been turned off. Subsequently the fan was used whenever the patient complained of pain or tingling. Efforts were made to adjust the speed and distance of the fan, so that the temperature of the feet was not reduced below 23° C. Cooling below 21° C. was liable to cause considerable discomfort.

CASE B.—For the first 6 days this man had no discomfort apart from a dead feeling in some of his toes. On the evening of the 6th day he had slight aching in both ankles and mild needle-like pains, chiefly in the right foot. On the evening of the 11th and 12th days after rescue the feet felt as if burning, and there was "electric stabs" into the borders of the feet. About this time the feet, especially the right, became hypersensitive to pressure. On the 13th day, during



Skin temperature changes in right great toe of case A during and after gradual cooling by electric fan. Rapid cooling, attained by suitably adjusting the speed and distance of the fan, produces a cooling curve of different type, the temperature falling 4–5° C. in the first 3 minutes.

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exposure of the unclothed body to a room temperature of 18° C. for 80 min., the left foot cooled satisfactorily, the right remained hot (great toe 30·5° C.). Vasomotor reactions to immersion of arms were normal in the left great toe, defective in the right. Colour changes of the feet on dependency and elevation were most definite in the right foot. A sweat test by Guttmann's method on the 15th day showed anhidrosis of plantar surfaces, toes and borders of the feet. The cold left foot showed a normal vasodilator response when heat was applied to the trunk. On the nights of the 14th and 15th days after rescue, the patient suffered considerably from aching and stabbing pains, chiefly in the right foot. On the 16th day these pains were promptly relieved by cooling the right foot with a fan. On the 18th day, with the unclothed body exposed for an hour to a room temperature of 17·1°–17·8° C., the left great toe cooled to 19·7° C., while the right remained hot at 30° C. Afterwards, with the fan at full speed 1 ft. from the soles, the hot great toe cooled to 21·6° C. in 22 min. The fan was switched off, but even after an hour, the patient having had food and hot tea, the right great toe showed no tendency to warm up to its original level. When the whole body, including the hands and feet, was covered with blankets for 100 min. the right foot again became hot, whereas the left foot remained cold (great toe 20·9° C.). The left great toe had cooled normally during exposure; its failure to warm up under blankets is not surprising considering its low initial temperature. The cooling of the hot right great toe under the influence of the fan is similar to that observed in A, in whose toes there was no evidence of vasomotor control. The fact that in B the right great toe did not immediately warm up again when the fan was turned off suggests that the skin vessels of this foot were beginning to regain tone. Even 5 days earlier (on the 13th day) reflex vasomotor reactions in the hot right great toe were not entirely lacking. On the 23rd day the right foot still failed to cool during exposure of the unclothed body for an hour to room temperature (19·7° C.), but by the 27th day both feet cooled normally on exposure.

DISCUSSION

Our experience in these cases of immersion foot, one mild and the other moderately severe, confirms Webster's finding that cooling the hot limbs relieves pain and tingling. Exposure of the feet to a cool room temperature (15°–18° C.) with a fan playing on the soles proved a simple and satisfactory method. It was not found necessary to spray cold water through the fan or to use ice-bags. The speed and distance of the fan were adjusted to maintain skin temperatures of 23°–26° C.; cooling to less than 21° C. gave rise to discomfort. Webster and his colleagues refer to severe cases in which premature removal of ice-bags was followed by marked increase of œdema, extravasation of blood and spread of gangrene. Clearly in such cases cooling must be continuous. In our cases, œdema had subsided before treatment was commenced; no exudation or necrosis followed interruption of cooling, and return to high skin temperatures was not necessarily associated with immediate return of pain and tingling. In these circumstances the fan would be used intermittently when symptoms called for it; between times feet remained uncovered, exposed to room temperature. For severe cases requiring long, uninterrupted cooling and not intolerant to restriction of leg movements, Greene's therapeutic refrigerator might well prove useful.

The mode of action of dry cooling requires further investigation; Webster suggests that, by reducing metabolic requirements, it overcomes a relative anoxia existing in the hot tissues. It has yet to be determined whether long cooling will influence the rate of recovery of the peripheral nerve lesions.

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Reviews of Books

Education in World Ethics and Science

Sir RICHARD GREGORY, Bt., FRS (Watts. Pp. 39. 1*s.*)

THE literature of scientific humanism now claims an ever-increasing body of distinguished contributors. Sir Richard Gregory stands so high among those who have concerned themselves with the application of science to education and human betterment that his opinions must always command attention and respect. His Conway lecture is timely, refreshing and rationalistic. He summarises the theme which the lecture develops by saying that "efficiency of individual service and right human conduct are the primary social aims of educational endeavour, whatever means or methods are used to promote them"; but he particularly traces the influences of the scientific age on conduct. Ethical principles themselves he claims as a part of the science of ethnology. The failures of orthodox religious teaching to advance social standards receive inevitable comment, while "the improvement of means of living, and the broadening of man's intellectual and social horizons" are as inevitably attributed in large part to scientific method and discovery. The social and disciplinary value of a natural training of the senses by observational studies is emphasised and the proper sequence of appeals in turn to the "wonder motive" (or curiosity), the "utility motive" (or instinct of power) and the "systematising motive" (or exercise of reason), is clearly outlined. We stand, or hope we stand, on the eve of great educational reforms. Whether their concern be with general, medical or other special education, the aims of the modern reformer are predominantly social and he should be grateful for the stimulus and wisdom to be found in this small book.

After Effects of Brain Injuries in War

KURT GOLDSTEIN, MD, clinical professor of neurology, Tufts Medical School, Boston. (Heinemann. Pp. 244. 21*s.*)

THE advantages of referring cases of brain injury to special centres has become obvious during the present war. As with other special war centres however there has often been considerable ignorance regarding important lessons learned in the last war. This is partly due to the difficulty of finding an account of these lessons which is readily accessible. This volume fills the gap. Professor Goldstein was attached to a special hospital in Germany for cases of brain injury and was connected with much research work in connexion with the effects of brain damage. His careful and detailed clinical observations will be specially appreciated by the medical neurologist. As an example of his clinical studies there are several pages devoted to the ways in which vision returns after occipital injuries. A chapter on the organisation of special hospitals will be found helpful to those faced with this task. He discusses methods of psychological laboratory examinations to determine the nature and degree of mental impairment by means of performance tests and tests for capacity to work, and stresses the part such tests will have to play in preventing the return of the patient to work he is unable to do. Such false starts may result in catastrophes. Special attention is devoted to methods of re-educating cases of dysphasia, and the book as a whole can be recommended to all who have to deal with cases of either acute or chronic head injury.

Carson's Modern Operative Surgery

Vol. I. (3rd ed.) Editor: G. GREY TURNER, LL D, MS Durh., FRCS. (Cassell. Pp. 1041. 50*s.*)

Carson's Surgery always held a high place in the esteem of practising surgeons, and this revised edition will secure its place for some time to come. The contributors are all surgeons of many years of experience, and this is reflected in their writings; the reader feels he will be on sound ground in following their descriptions and advice. This volume covers the fields of anæsthetics, orthopædics, thoracic surgery, the surgery of the abdomen and that of the spinal cord. A useful section is that on the conservative treatment of surgical tuberculosis. It is difficult to pick out sections for special comment but Hey Groves's chapter on operations upon bones is particularly satisfying while the many chapters on abdominal surgery (all of which are written by the editor except the one on the stomach) will be specially helpful to a young practising surgeon.

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THE LANCET

LONDON: SATURDAY, MAY 29, 1943

CERTIFICATION AND STATE SERVICE

A YEAR ago one of our correspondents pointed out that a government which introduced higher sick-pay might want to control the doctors who certify sickness.[1] Sir WILLIAM BEVERIDGE, it will be remembered, refrained from discussing the details of the national health service he desires, but he said it must "ensure the careful certification needed to control payment of benefit at the rates proposed in this report."[2] Dr. CHARLES HILL, deputy secretary of the British Medical Association, believes that this need to control certification explains why the Government is pressing forward with plans for a comprehensive medical service while leaving other proposals of the Beveridge report in abeyance. Medical certification would be responsible for the major outgoings of the proposed security fund, and as sick benefits are to be increased it is necessary to establish a stricter control over certification. "Our answer," said Dr. HILL, "is obvious. The doctor's job is to decide whether a man is fit for work, no matter whether the cash value of his certificate is five or fifty shillings a week."[3]

We agree with Dr. HILL that this is the doctor's job; and we think he nearly always does it. But neither he nor we can say that it is easy. A writer in the *British Medical Journal* has lately put the difficulty like this[4]:

> "a doctor is . . . in the improper position of affecting his own interests by certifying or refusing to certify at the request of the patient. He is like a judge who has an interest in the result of a case which he is called upon to try. He will react to this situation in one of two ways. Most commonly his professional judgment will be subject to a conscious, partially conscious or unconscious bias in favour of issuing the certificate; or, if he has an obsessional over-conscientious personality, his professional judgment will be subject to a bias in the opposite direction. The former reaction is the more frequent. This mechanism is often observable in questions of conflict over personal injury. . . . Here doctors of more or less and often of approximately equal knowledge and ability will be found on opposite sides giving widely divergent opinions on ætiology and prognosis; whereas if they were in consultation over the same case in non-controversial circumstances the odds are that their views would vary very little, if at all."

The Government, in suggesting salaried employment for general practitioners, wants to ensure that their certificates express the opinion they would give in "non-controversial circumstances" when their own interest is not involved. Certainly this is one solution of the problem, but it is not a complete solution unless the doctor, having changed employers, forgoes any personal relationship with his patient. He would then become disinterested but possibly also uninterested. Another solution would be to say that when sickness lasts more than a limited time a certificate must be made out by a hospital or medical referee. This would relieve the family doctor of a responsibility that is sometimes unwelcome. On the other hand there are many practitioners—thank Heaven—who do not want to be relieved of this or any other responsibility, and we believe that in actual fact the large majority discharge it very well, so that their certificates contain a good and honest opinion. Would it not be possible to ensure the "careful certification" that Sir WILLIAM BEVERIDGE demands by applying strong penal measures—indeed, exclusion from practice—to those who habitually transgress and have thus weakened the position of their profession?

All these suggestions can be judged from experience. Many of our readers enjoy the impartiality that comes from salaried employment. Others know the work of regional medical officers who act as referees. Others could write with authority on the deterrent effect of removal from the Medical Register. If Dr. HILL's analysis of the present situation is correct, it would be well to give further and immediate thought to Sir WILLIAM BEVERIDGE's requirement.

1. *Lancet*, 1942, i, 777.
2. Social Insurance and Allied Services. Cmd. 6404. HMSO.
3. *Brit. med. J.* May 22 (Suppl.) p. 61.
4. Sharp, B. B. *Ibid.* Dec. 26, 1942 (Suppl.) p. 79.

INFECTIVE HEPATITIS AND SERUM JAUNDICE

IN peace-time infective hepatitis, or catarrhal jaundice as it was usually called, was regarded mainly as a disease of childhood; but it is now widely prevalent both in combatant forces and among civilians of working age. Army outbreaks have been studied by VAN ROOYEN and GORDON[1] in the Middle East and by STUHLFAUTH and others[2] among German troops in occupied territories and on various fronts. In Great Britain there have been many small epidemics in the civilian population and a good account of one of these is given by FORD in our present issue. In all countries the clinical manifestations have been much the same, and have been similar to those noted before the war.

Although in individual cases or groups of cases certain signs and symptoms predominate and others are absent, a composite picture of the illness would be somewhat as follows. The onset is often marked by fatigue, headache, loss of appetite and an urticarial or morbilliform rash. There may be nausea and vomiting, diarrhœa or constipation, abdominal pain or a feeling of fullness, or generalised aches and pains and stiffness of the joints. These prodromal symptoms are not uncommonly dismissed as a chill on the liver, "gastric flu" or a bilious attack. Jaundice may appear shortly after the onset of these symptoms, and when this happens the patient usually feels better. Alternatively, the prodromal symptoms may disappear and jaundice develop after a free interval; while some cases have a transient choluria but never show jaundice. Nearly always the jaundice disappears within a month, but a few cases progress to a subacute liver atrophy, and very occasionally the patient dies with "acute yellow atrophy." Observation of short and "only possible" exposures made by BOOTH and OKELL[3] and by PICKLES[4] indicate an incubation period of about 20–40 days. Cases are probably infectious during the pre-icteric phase and there are instances of patients being infectious several days after jaundice is evident. The disease

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2. Stuhlfauth, K. *Dtsch. Militärarzt*, 1941, 6, 591; Dietrich, S., *Dtsch. med. Wschr.* 1942, 68, 5; Gutzeit, K. *Münch. med. Wschr.* 1942, 89, 161, 185; Jacobi, J. *Ibid*, 1942, 89, 615.
3. Booth, W. G. and Okell, C. C. *Pub. Hlth, Lond.* 1928, 41, 397.
4. Pickles, W. N. Epidemiology in Country Practice. Bristol, 1938.

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seems to be spread by droplet infection. PICKLES drew attention to its serial incidence in families, and FORD also notes this feature, although he also found parallel infection frequent.

Hepatitis clinically indistinguishable from the above disease has been observed during the past few years in persons who have received injections of certain batches of measles convalescent serum, adult serum, mumps convalescent plasma, and yellow-fever vaccine containing serum. The interval between injections and symptoms has varied considerably [5] but has usually been 2–4 months. This interval is so much longer than the 20–40 days incubation period of infective hepatitis that it seems doubtful whether infective hepatitis and serum jaundice have the same causal agent. Search for a causal agent of any kind, however, has so far been disappointing.

ANDERSEN [6] in Denmark claims to have infected pigs with material from cases of the disease and SIEDE and MEDING [7] report transmission to developing chick embryos; but these results have not been confirmed, and animal transmission experiments have generally failed. VOEGT,[8] on the other hand, has reported transmission to human volunteers by oral administration of duodenal washings and by subcutaneous and intramuscular injections of serum and blood from cases of infective hepatitis, and years ago FINDLAY, DUNLOP and BROWN [9] presented presumptive evidence of a laboratory infection from blood from a case of infective hepatitis. Now, on p. 678 FINDLAY and MARTIN describe the production of hepatitis in volunteers who received nasal washings from cases of hepatitis following inoculation with yellow-fever vaccine. In two of these volunteers symptoms developed 28 and 30 days after the intranasal instillation, and in a third volunteer they came on 56 days afterwards. It is recognised that differences in the route of inoculation of virus affect the latent period before the onset of symptoms, and FINDLAY and MARTIN suggest that infective hepatitis and hepatitis following the injection of yellow-fever vaccine are caused by the same virus—the different portals of entry being responsible for the difference in incubation. However, the hepatitis following intravenous inoculation of mumps convalescent plasma almost always developed between 60 and 100 days after the inoculation, and if the icterogenic agent is the same it is hard to understand why the intravenous inoculation should be followed by the long incubation period. The clinical picture of infective hepatitis and serum jaundice suggests a generalised disease; so it is not really surprising that an icterogenic agent has been isolated from the nasopharynx of FINDLAY and MARTIN'S patients. As regards their natural infectivity, it is a remarkable fact that there has so far been no report of contact infections among the large number of men exposed to the 28,585 cases of jaundice in the American army following inoculation with yellow-fever vaccine.

Thus we seem still to be no closer to establishing that infective hepatitis and serum jaundice have a common cause. Nor do we yet know their relation to the jaundice so often seen in patients undergoing treatment with arsenical preparations. Tentatively, the apparent possibilities are:

(1) These three conditions are due to infection with one and the same virus. The immunity of the usual childhood infection is usually permanent but is capable of being overcome by direct inoculation of the causative agent in the presence of certain other unknown secondary factors.

(2) There are different agents producing the same clinical picture but not mutually protective. (This is true of influenza viruses A and B.)

(3) There are different strains of the same virus antigenically related. Infection by one of them does not necessarily give complete protection against others. Hepatitis may therefore develop if resistance is lowered—e.g., by deficiency of an essential cell metabolite or injection of a toxin.

Of course till otherwise proven there is still a possibility that some of the conditions are not caused by a virus at all. Further light should be thrown on this when the facts are known concerning the preparation of the yellow-fever vaccine injected into the patients from whom FINDLAY and MARTIN obtained their material. As mentioned in our issue of May 14 the Medical Research Council has selected a team of full-time workers to try to unravel some of these knotty problems.

THE CRYOPATHIES

TISSUE damage by cold has been a serious cause of casualties in previous wars and a catastrophic one in this. The British forces, though they have done little fighting in severe weather conditions, have not been altogether spared. Modern opinion on the pathology and treatment of frostbite has recently been summarised by GREENE in a Hunterian lecture [1] and the closely similar condition, immersion foot, was the subject of discussion on May 20 by the section of neurology of the Royal Society of Medicine.

It is no longer permissible to draw a sharp dividing line between frostbite and immersion or trench foot. Both conditions begin with a stage of ischæmia, the physiological reaction of the tissues to cold. During this stage of ischæmia, despite reduced metabolism, some damage is done to all tissues, though this is not at first histologically obvious. The skin reacts unspecifically by the production of the H substance (LEWIS [2]) which tends to overcome the initial ischæmia by local vasodilatation and also increases capillary permeability. When a thaw sets in, or when damage to nerves allows the vasoconstriction to relax, the full arterial pressure is transmitted to the unduly permeable capillaries, which at once begin to leak—the stage of hyperæmia and œdema. The exudate exerts pressure on the venous end of the capillary bed, sufficient to embarrass the circulation and produce congestion, which may cause tissue damage of mild degree. This is the limit reached in most cases of immersion foot. Sometimes however, and always in true frostbite, the exudation of fluid is so great that the blood-cells are stranded and the vessels become silted up—a process suggested by RICKER,[3] TANNENBERG [4] and ROTNES and KREYBERG,[5] and recently confirmed by GREENE. The tissues beyond the obstruction are

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6. Andersen, T. T. *Acta med. scand.* 1937, 93, 209.
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2. Lewis, T. *Brit. med. J.* 1941, ii, 795, 837 and 869.
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4. Tannenberg, J. in Tannenberg und Fischer-Wasels's Handbuch der norm. und path. Physiol. 1927, vol. vii, p. 1496.
5. Rotnes, P. L. and Kreyberg, L. *Acta path. microbiol. scand.* 1932, 11, 162.

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deprived of oxygen and gangrene follows rapidly. It is on these pathological changes that immediate tissue loss depends.

More remote, and when we are considering immersion foot more important, effects are due to the damage done to nervous tissue by cold. Neglected somewhat by earlier investigators, these effects have now been studied in detail by UNGLEY and BLACKWOOD.[6] By examining the sensory loss, and motor, sudomotor and vasomotor responses, they have shown that in severe cases there is degeneration of nerves, followed by a stage of partial regeneration with hypersensitivity to cold and to circulating adrenaline. As GREENE put it at last week's meeting, cold carries out a natural postganglionic sympathectomy. Finally complete recovery may take place, or there may be sequels such as Raynaud's phenomenon, Zenker's, degeneration of muscle and Sudeck's bone atrophy.[7]

It is against the background of UNGLEY's observations that we must consider the suggestion of many continental surgeons that the cryopathies should be treated by interference with the sympathetic control of the peripheral vessels, by local infiltration with procaine, by nerve block, by injection of the lumbar sympathetic chain or by sympathectomy. The suggestion appears to have arisen from undue concentration on the ischæmic phase, and the desire to end it as quickly as possible. Actually however, as many authors have pointed out, it is during the hyperæmic phase that the acute tissue damage occurs. As every patient, when rescued, is already in the hyperæmic phase, or passes into it immediately and with damaging celerity, it seems hardly likely that any benefit will come from cutting off the sympathetic supply. A postganglionic sympathectomy has already been performed by the cold before the surgeon has a chance to intervene. Whether it is worth while at a later stage, in cases that do not recover completely, to convert the postganglionic into a preganglionic sympathectomy is another matter, but at the RSM neither Sir THOMAS LEWIS nor Prof. J. R. LEARMONTH were optimistic. It could, perhaps, be argued that first-aid sympathectomy might do good by disintegrating the static columns blocking the vessels and thus restoring circulation to the distal tissues; but it is at least equally likely that increase in arterial flow would cause an increase in transudation and still greater damage.[8,9] The workers who have written favourably of sympathetic operations have described only uncontrolled results in human patients—an unconvincing line of argument in a disease which to the inexperienced surgeon looks worse than it is, and in which ultimately complete recovery is so common. The only controlled experiment is that of ORLOFF[10] who claimed to have completely protected the tails of mice by injecting procaine into their proximal ends six hours after freezing. In the RSM discussion his technique was adversely criticised by GREENE, who had repeated the experiments but could not confirm the findings. Having treated patients on similar lines, LÄWEN,[11] too, declares against the method; he obtained very little rise in local temperature by procaine infiltration of the main nerves to injured limbs. The question cannot be regarded as settled, but the outlook for sympathetic denervation is poor.

Treatment by chilling the injured part seems more hopeful. Many authors have in the past issued warnings against any form of warmth during recovery, and actual cooling has lately been advocated by GREENE[1] and by WEBSTER and his associates.[12] They point out that, if the damaged parts are kept cold, metabolism is lowered and the oxygen overdraft reduced; exudation is controlled, gangrene stayed, and the patient's comfort correspondingly increased. In our present issue, UNGLEY provides further support for this thesis. There is evidence, indeed, that in the treatment of injury by cold, civilised man has lost the instinctive knowledge of primitive peoples who realise the danger of warmth. Airmen and soldiers suffering from cryopathies are still occasionally subjected to hot-water bottles, mustard plasters, and hot fomentations. Such treatment is not only extremely painful but definitely harmful. Let us hope that UNGLEY's confirmation of this view will give the coup-de-grâce to such malpraxis.

NEW SCHOOL KITCHENS

THE Children's Nutrition Council reports[13] that in October last year nearly a million school-children were receiving a canteen meal on each school day. This represents a substantial increase over the 300,000—or 3% of the total—receiving such meals at the beginning of the war; and the President of the Board of Education, when opening the West Riding authority's school at Darfield on May 17, was able to announce a further increase in number to 1,250,000. Even so, only 25% of children in the country are getting school meals which, as the CNC has often pointed out, can provide them with the essentials of a balanced diet; and this still falls far short of the target of meals for 75%, at which Mr. Butler tells us the Government aims. In a circular issued to local authorities (no. 1629) the Board announces that to hasten the programme it has been settled that after May the Ministry of Works will freely supply, erect and equip complete kitchens, sculleries and canteens for authorities who need them; and they will also adapt school premises as far as possible where that is necessary. Canteen and kitchen equipment will also be supplied free of charge after that date. Authorities are to receive sketch plans of kitchens and lists of equipment on scales designed to supply 300 to 2500 dinners a day; the plans allow for the use of various types of fuel, and for either self-contained canteens or central kitchens. It seems that the building work entailed in providing dining-rooms is about three times as much per child as that entailed in providing kitchens, even when children are to dine in two shifts, so that school halls or classrooms must still be used wherever possible; but where the numbers of diners are increasing beyond the scope of the accommodation prefabricated huts are to be put up. This is at once an imaginative and practical plan, and should do much to maintain school-children in a state of sound nutrition, especially if the Board's plea for dinners that are "good and ample . . . relatively costly and adequate in quality" is to be honoured in new dining-rooms and old alike.

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11. Läwen, A. *Disch. Militärarzt*, 1942, 7, 479.
12. Webster, D. R., Woolhouse, F. M. and Johnston, J. L. *J. Bone Jt Surg.* 1942, 24, 783.
13. *War-time Nutrition Bulletin*, March, 1943, No. 25.

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Annotations

PSYCHOSOMATIC ILLNESS AND MORALE

A RECENT paper by Halliday [1] brings psychiatry into close relation with the social problems awaiting the planners of a world where the worker shall be satisfied with his work and its rewards. Coalmining has always been marked by industrial strife, and it is noteworthy that miners in the United States have just shown a disconcerting solidarity in making demands upon the community at a time when individual interests might be sacrificed to greater needs. Before judging, we may ask what there is in the conditions of work to prompt such action, and Halliday, starting with a study of illness, finds himself involved in this wider question. He finds in coalminers a great increase of psychosomatic disorders, in which are concerned mental factors, chiefly emotional, provoked by the environment. Of the discomforts and risks of coalmining we all know, though it would be wrong to say we are familiar with them; the visitor who has groped and stumbled along the murky road to the coal-face can only begin to understand them. The miner is traditionally brave in the face of disaster—indeed, we now know how well ordinary folk can face acute and appalling physical events—but the constant presence of danger throughout the working day inevitably produces fear, both conscious and unconscious. Halliday, stressing in addition the physical discomforts of underground work, analyses the psychosomatic responses that appear as apparent physical diseases. Their disguises are manifold: frank psychoneuroses are common, and anæmia, debility, bronchitis, gastritis, cardiac debility (also DAH and tachycardia), rheumatism and fibrositis, appear in almost doubled frequency among miners as compared with non-miners—though he quotes Dickson [2] in support of his belief that these disorders have also greatly increased in the general population during the inter-war period. Agreeing with Culpin [3] that miners' nystagmus and night-blindness among soldiers should be placed in this group of disorders, he notes that the incidence of the former fell abruptly about 1930 because, he suggests, compensation-rates became lower than those for sick relief in general; this illustrates the basic unity of a seemingly heterogeneous group of disorders. The rate of increase in incidence is highest among the younger men, and this Halliday ascribes to altered working conditions and altered social factors. With the introduction of coal-cutting machinery the miner has become merely a shoveller of coal, and pride in skill has been lost. Noise prevents him from sensing possible danger, and seven hours "spent in working in positions and attitudes that must be seen to be believed" are only broken by fifteen minutes' leisure to "eat his piece." It seems that the older age-groups still have their roots in a tradition that no longer nourishes the younger generation, who are ready to stop work at a day's notice simply for the sake of not going down the pit under present conditions.

Halliday regards all this as indicative of a general trend. So long as the death-rate fell, major epidemics were absent and the weight and height of school-children increased, it was assumed that all was well with the public health. But the rising incidence of these disorders, the rising suicide-rate, and the fall in the birth-rate, indicated an opposite trend—that of social ill health which could be correlated with social economic factors. After the collapse of France in 1940 there came a change. With a definite end in view life became purposive and interesting. There was a general alleviation of frustrating factors through the growth of employment and the stabilising of wages. The introduction of rationing gave a new sense of equality and unity. Contrary to what some expected, there has been no notable increase of psychoneurotic or psychosomatic disorders, except perhaps in those people exposed to severe and direct mental trauma. These considerations suggest that the peak of the wave of social un-health has passed, but there remains the lesson that in the prevalence of these disorders we have a statistical index of social health.

1. Halliday, J. L. *Psychosomatic Med.* 1943, 5, 71.
2. Dickson, D. E. *Edinb. med. J.* 1936, 43, 696.
3. Culpin, M. Recent Advances in the Psychoneuroses, London, 1931, p. 193.

A NATIONAL COUNCIL OF MENTAL HEALTH

BEFORE the war the three principal voluntary mental-health associations—the Central Association for Mental Welfare, the National Council for Mental Hygiene and the Child Guidance Council—were separate and autonomous, covering in the main different parts of this field of social service, but inevitably overlapping to some extent. The Feversham Committee on voluntary mental-health services advised that they should amalgamate, and early in 1939 a first step was taken in the founding of the Mental Health Emergency Committee. The three bodies announced last week that after four years' experience the new position is to be consolidated and that pending complete legal and financial amalgamation a Provisional National Council of Mental Health has been established under the chairmanship of Sir Otto Niemeyer. The new council will take over the work of the emergency committee and will carry on the work of the three constituent bodies through joint committees, thus economising in time, labour and money. Responsibility will fall on the council for providing training courses for doctors, psychologists and teachers hitherto offered by the three organisations separately; for running homes and hostels for various types of patient; for social work, and work among delinquents and children needing psychological treatment; for providing new clinics; and for talks and lectures on mental health arranged for the general public. It is a hopeful programme, entered in that spirit of coöperation with statutory and official services which has always distinguished the three parent bodies of the new council.

CLEANING MILK BOTTLES

THE abolition of the milk-can and the grossly insanitary methods connected with it was an advance in hygiene which proceeded rapidly and with little opposition; but an entirely satisfactory method of milk distribution has not yet been found. From the bacteriological point of view, the best vehicle for milk is the waxed cardboard container used but once, for these can be obtained practically sterile and need little handling. But they are expensive (now unobtainable) and liable to bruising with consequent leakage in transit. From the consumer's point of view the returnable capped bottle is as convenient, and if wastage by breakage and failure to return the bottles is reduced to reasonable dimensions they are cheap. They are, however, not easy to clean—experimentally they are easy to sterilise but on a commercial scale they are not, and if unsterilised they may be a dangerous source of infection. Dr. Betty C. Hobbs and Prof. G. S. Wilson, of the London School of Hygiene and Tropical Medicine, at the request of the Ministry of Health, have reported on the process of cleaning and sterilisation now in use and have suggested improvements. Absolute sterility is not necessary and could not be obtained commercially; but the results of bacteriological examination of bottles alleged to be clean are not good enough to pass, though it is satisfactory that in no case were coliform bacteria recovered from the washed bottles, so the processes used would presumably destroy any pathogenic organisms present in the returned bottles. The conclusion is drawn that the organisms found in washed bottles are derived mainly from post-detergent treatment—that

1. *J. Hyg. Camb.* April, 1943, p. 96.

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is, from rinsing waters. A suggested remedy is the addition of chlorine to the rinse waters; this is widely used in the United States, but not favoured by Hobbs and Wilson. The method they advocate is the removal of the detergent by rinse waters at too high a temperature for bacterial growth, and cooling of the bottle by external rinses with recirculated water at progressively decreasing temperatures, followed by a final internal and external rinse with cold water direct from the main. The use of caustic soda as a detergent is almost essential, but such substances as sodium metasilicate, phosphate and carbonate can be added with advantage to increase wetting, softening and deflocculating, though they cannot replace the caustic soda. Hobbs and Wilson favour the narrow-necked milk bottle with a press-on metal cap and condemn the wide-mouthed bottle with press-in disks. The latter have been found responsible for many outbreaks of paratyphoid and typhoid in America and there is general agreement that they should be discarded as quickly as circumstances permit.

SULPHAPYRAZINE

THE possible chemical modifications of sulphanilamide are numberless, and for several years the research laboratories of manufacturing firms have been busy preparing and testing new compounds of this type. The most successful line has been the insertion of a heterocyclic ring into the sulphonamide group, and in this way sulphapyridine, sulphathiazole, and more recently sulphadiazine have been produced. Each of these has its own advantages and disadvantages which render it more suitable for some purposes than others. Among the latest compounds to emerge is sulphapyrazine, in which a pyrazine ring $\begin{matrix} -C- & NH & -CH \\ \| & & \| \\ CH- & NH & -CH \end{matrix}$ is present. This compound has been used especially against pneumococci, and reports on its activity in human and experimental infections have been published by Ruegsegger and his colleagues.[1] Recently Schmidt and Sesler[2] have investigated its action against experimental streptococcal infections, and have analysed the pharmacological peculiarities which differentiate it from the other common sulphonamides. When it is administered to mice in large repeated doses, its curative power is about the same as that of equal doses of sulphanilamide, sulphapyridine or sulphathiazole. But when small doses are used it is much superior to them all except sulphadiazine, with which it is about equal. A study of the blood concentration on different doses shows that it is only slowly absorbed and slowly excreted. Consequently even small doses produce a fairly high and prolonged concentration in the blood, and an increase in the dose causes only a small rise in the resultant concentration in the blood. These properties should be useful in clinical practice, since less frequent doses would be needed. Moreover, the slow absorption would offer an additional safeguard against toxic effects from overdosage. On the other hand, if a high blood concentration is required for the treatment of a severe case it is difficult to obtain by the oral administration of sulphapyrazine, and it is better to give sodium sulphapyrazine by injection. From another aspect, the slow absorption of sulphapyrazine in the alimentary canal might be expected to make it useful against dysenteric infections of the lower bowel as a substitute for sulphaguanidine. White[3] has found sulphapyrazine very effective in reducing the number of coliform organisms in the intestines of mice, but adequate studies on patients with dysentery are not yet available. To sum up, sulphapyrazine resembles sulphadiazine in many ways, and may possibly be used instead of sulphaguanidine against dysentery, but it remains to be seen whether it has any advantage over these compounds.

1. Ruegsegger, J. M., Hamburger, M. jun. et al. *Amer. J. med. Sci.* 1941, 202, 432.
2. Schmidt, L. H. and Sesler, C. L. *J. Pharmacol.* 1943, 77, 277.
3. White, H. S. *Bull. Johns Hopk. Hosp.* 1942, 71, 213.

THERAPEUTICS MADE EASIER

IT is seventy-five years now since the practitioner could excuse himself for not keeping up to date in his treatment on the ground that he had no time or opportunity to assess the value of the new published work and nowhere to turn to for a readymade assessment. For with its June number the *Practitioner* completes its seventy-fifth year, and its main job in that long and active life has been to keep the doctor in general practice abreast with established therapeutics as distinct from its tender growing shoots. In his preface to the first number for July, 1868, the *Practitioner's* founder and first editor, F. E. Anstie, described his journal as a special medium for the intercommunication of information about the uses of remedies, and he and his successors —Lauder Brunton, Donald MacAlister, Mitchell Bruce, Malcolm Morris, Bosanquet, Arbuthnot Lane; to the present editors, Sir Humphry Rolleston and Dr. Alan Moncrieff—have kept the same object, though in these 900 monthly issues the word remedies has been stretched to include the whole range of useful therapy from cerebral surgery to chiropody, and from pædiatrics to geriatrics.

BRIDGING GAPS IN NERVES

EXTENSIVE lesions of peripheral nerves can be repaired by end-to-end suture if the stumps are brought together by joint flexion, mobilisation of the nerve and, in some cases, nerve transposition. The limb is immobilised until the stumps have become united at the suture line, and is then gradually allowed to return to its normal extension. But cases reported by Highet and Holmes[1] show that there is a limit to the size of the gap which can be closed by such methods. In four cases of traction injury to the lateral popliteal nerve more than 11 cm. had to be resected before suture, and no recovery took place although the limb was immobilised for at least three weeks after suture and extended gradually over a period of several months. In a similar case in which resection of only 6 cm. was necessary a good recovery is in progress. Highet and Holmes point out that very extensive resections of peripheral nerve lesions were described in the records of the last war, but that the cases were not followed up in such a way as to make it possible to assess the effect of the extent of the resection on recovery. They examined the sutured nerves histologically when they had failed to recover, and found a massive proliferation of collagen which in some cases had led to complete obliteration of the nerve, though there was no sign of retraction of the stumps. They conclude that although end-to-end suture may be possible by appropriate technique, no useful recovery can be expected if the length of nerve resected is so large as to necessitate great postoperative stretching, and they analyse a short series of cases from the present war which gives some indication of the resections compatible with recovery. Experience in the last war left British surgeons sceptical of the alternative operation of nerve-grafting, and in 1920 they recommended it only as a last resort.[2] Since then, however, nerve-grafts have been successfully used in repairing the facial nerve, and their other applications are being explored. Gutmann and Sanders[3] have compared the functional results of different kinds of nerve-grafts in the rabbit. Autografts gave recoveries which were similar in time of onset and final degree to those of suture. Homografts were less successful, though when the graft was stored for up to three weeks in Ringer's solution at 2° C. before insertion, the results closely approached those of autografts. Recoveries were also occasionally seen after the use of alcohol-fixed grafts, but they were as poor and as in-

1. Highet, W. B. and Holmes, W. *Brit. J. Surg.* 1943, 30, 212.
2. MRC Report No. 54, London, 1920.
3. Gutmann, E. and Sanders, F. K. *Brain*, 1942, 65, 373.

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frequent as when no attempt was made to aid natural repair. In addition to the closure of gaps so extensive as to be irreparable by nerve stretching, grafting appears to be the method of choice in the repair of digital nerves, of the facial nerve in the temporal canal and of brachial plexus lesions, particularly injuries to C5 and C6, where extensive mobilisation is difficult. The introduction of less difficult methods for fixing grafts, such as the plasma "glue" described by Seddon and Medawar,[4] will certainly lead to a more extensive clinical trial of grafting for peripheral nerve injuries.

HEALTH OF THE NATION

BEFORE the last world war infant mortality was usually regarded as the most sensitive index of social conditions. In recent years, with the decline in infantile diarrhœa and other causes of death in the first year of life, it seems that ages 1–5, and in particular 1–2, have usurped its position and are those most susceptible to such environmental factors as urbanisation or density of persons per room. The changes in mortality that have taken place at these ages in the short space of time spanned by the two wars is nothing less than astounding. In 1911–14 children aged 1–2 died at the rate of 34 per 1000 living or, roughly, 1 in 30. The postwar years 1921–30 produced an improvement of some 40%, the rate falling to 20 per 1000; in 1931–5 it continued to decline, and reached 13 per 1000. In 1939 there was a sudden and dramatic change; the mortality-rate was halved and was only a fraction over 6 per 1000. The years 1940 and 1941 saw a slight setback due to enemy action and the unfavourable weather, but 1942 provided a new low record with a rate of 6 per 1000; only 1 death in 170 living compared with the 1 in 30 but a generation earlier. At ages 2–5 much the same improvement is to be seen, for the death-rates per 1000 have been 9 in 1911–14, 6 in 1921–30, 4·4 in 1931–5, 2·6 in 1939, 3·6 in 1940, 4·0 in 1941 and 2·6 in 1942.

On p. 672 Dr. Stocks gives cogent reasons for believing that much of this fall in mortality in 1939 is attributable to the sulphonamide group of drugs. Analysing the recorded deaths by cause he finds that the greater part of the improvement since 1938 has been in diseases either directly affected by sulphonamides or else commonly fatal from infective complications likely to have been treated with them. It is doubtful, as he writes, whether national vital statistics have shown any achievement more remarkable than the halving of the total death-rate from disease at the pre-school age-period in the course of only six years (6·11 per 1000 in 1931–35 and 3·07 in 1939). Remarkable, too, he points out, was the general mortality record of the country in its third year of war. Even including deaths due to enemy action and making no allowance for the recruitment of the more physically fit, the standardised death-rate of civilian females reached a new low level; at 6·80 per 1000 it was 9% below the previous lowest rate of 7·43 recorded in 1939. Civilian males gave a standardised rate of 9·54, which is also a low record, though it must be considerably influenced by selective withdrawals from civilian life. Infant mortality cannot yet be calculated precisely, but will certainly differ negligibly from the record figures of 50 per 1000 registered in 1939.

Among the items contributing to these favourable totals is a decline of 11% in deaths from all forms of tuberculosis compared with 1941; but it must not be forgotten that the mortality from this disease remains considerably above what would have ensued if the peace-time downward trend had continued. Deaths from diabetes increased in 1939 and 1940 but began to fall early in 1941, about a year after the introduction of rationing. They fell still lower in 1942. Peptic ulcer has followed a similar course, with an increase in the early stages of the war and a return in 1942 to the pre-war level. Cancer shows no appreciable change, and the rapid fall in rheumatic fever and exophthalmic goitre has not been interrupted. In childhood the diphtheria death-rate of 1942 was the lowest ever recorded and 14% below the previous record. Of diseases affecting mainly advanced ages, nephritis and gangrene deaths have decreased, cerebral vascular lesions and other arterial diseases show little change, and mortality attributed to coronary disease and angina pectoris has continued its rise. Mortality is not the same as morbidity, and there may be minor illness, resulting from fatigue, which is not reflected in these figures. Nevertheless, in time of war they are astonishing and speak well for the standards of living we have been fortunate enough to maintain, as well as for the efficacy of modern methods of treatment which Dr. Stocks rightly emphasises. The mortality figures for the large towns of Greater Germany, analysed in the *Times* last Monday, give a different picture, with death-rates rising in the young from infancy onwards, and especially in adolescents of 15–20.

4. Seddon, H. J. and Medawar, P. B. *Lancet*, 1942, ii, 87.

ALBUMIN AND GLOBULIN LEVELS IN SERUM

AMONG the less useful phrases learnt by the student, and used by him to annoy the examiner, and later the clinical laboratory, is "reversed albumin–globulin ratio." Kagan[1] points out that this reversal, by itself, does not indicate any particular disease, and in a series of estimations on 345 patients shows that it may be due to excess of globulin, reduction of albumin or a combination of both. Since a low globulin level has been noted only in prematurity, soon after severe hæmorrhage and in advanced cirrhosis, it seems safe to assume that the globulin level is usually not reduced by disease, and any substantial variation is an increase. Three groups of cases were distinguished in his series:—

(1) Total protein above 7·5%. Always due to increased globulin (9% of his cases).

(2) Total protein below 7·5% where the reduction was due solely to reduced albumin (65%).

(3) Total protein below 7·5% when albumin was reduced and globulin raised (26%).

This last group included all forms of hepatic disease as well as neoplasm and heart-failure, acute glomerulo-nephritis and a combination of diseases such as lympho-granuloma venereum, which gives a raised globulin, and malnutrition which gives a reduced albumin.

The reversal of the A : G ratio was noted so often and in so many diseases that its continued application is no longer justified. In most cases a total-protein estimation should suffice, an increase being attributable to globulin and a fall to albumin. This could be brought out by a simple test for raised globulin, such as the formol-gel test or the globulin-precipitation test. Only in the small group of diseases in which albumin may be reduced and globulin simultaneously raised is there any justification for embarking on the more complex procedure of total albumin and globulin estimations.

THE court of governors of St. Thomas's Hospital loses a loved officer by the resignation, through illness, of Sir ARTHUR STANLEY. He can look back on a long record of social service; he has served the hospital for 26 years as treasurer; his work as chairman of the British Red Cross and of the Joint Council of the Red Cross and the Order of St. John has borne fresh fruit in the past few years; and from 1898 till 1918 he was chairman of the Royal College of Nursing. His presence, calm and confident, is an asset in any committee or on any platform; and fortunate have been the causes he has taken under his wing. Sir Arthur is an honorary fellow of the Royal College of Physicians of London, and the governors of St. Thomas's, under their new president, the Archbishop of Canterbury, have fittingly elected him a vice-president of his old hospital.

1. Kagan, B. J. *Arch. intern. Med.* 1943, 71, 157.

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Special Articles

GENERAL MEDICAL COUNCIL

PRESIDENTIAL ADDRESS

OPENING on May 25 the 158th session of the council Mr. H. L. EASON recorded with regret the death on May 17 of Sir Arthur Newsholme, the last holder of the post of medical officer of the Local Government Board, who sat on the council as a Crown nominee from 1910 to 1919—"a distinguished member of that distinguished line of chief medical advisers of the Government, including Simon, Thorne Thorne, and Power, among the dead, from whose informed and willing coöperation we have profited and continue to profit in growing measure as the concern of the state with medicine widens and deepens." Mr. Alex. Miles, who had represented the Royal College of Surgeons of Edinburgh for 15 years, had been compelled on medical advice to retire from the council. He had served for ten years on the executive and for various periods on the finance and other committees "His perennial youth both in mind and body, sober judgment, and wise counsel, especially as a member of the penal cases committee, make his retirement a heavy loss to the council." His place had been taken by Mr. Henry Wade, who brings to the assistance of the council experience of the active practice of medicine and surgery.

INTER-DEPARTMENTAL COMMITTEES

The Minister of Health and the Secretary of State for Scotland have appointed a committee to consider and report upon:

(*a*) The progressive stages by which, having regard to the number of practising dentists, provision for an adequate and satisfactory dental service should be made available for the population;

(*b*) The measures to be taken to secure an adequate number of entrants to the dental profession;

(*c*) Existing legislation dealing with the practice of dentistry and the government of the dental profession;

(*d*) Measures for the encouragement and coördination of research into the causation, prevention, and treatment of dental diseases.

This committee, said the President, have invited both the Council and the Dental Board to give evidence, some of it as early as the third week in July. It would be impossible for either to prepare a final memorandum by that date, but evidence on matters of fact would be submitted.

Representatives appointed at the November meeting (with the substitution of Dr. Hedley for Sir Farquhar Buzzard, prevented by illness) had given evidence in March before the Inter-Departmental Committee on Medical Schools on the lines of the memo already approved by the council, and had expressed certain personal opinions on questions raised at the committee. The memo itself had been published.

PRESS PUBLICITY

A person who obtained admission to one of our meetings in November had thought fit, said the President, to take a photograph of the council in session, and to enable the press to publish the photograph, presumably for his own gain. We are neither a customs authority who can search our visitors as they enter, nor a court who can commit them to prison for contempt. I am therefore compelled to take the not very hopeful course of appealing to the finer feelings of the person concerned, and of any others of like inclinations, by making the announcement, which ought to be superfluous, that such publicity is most unwelcome to the council; and that any person who is caught taking surreptitious photographs in the council chamber will be removed from the premises, and will not, if we can prevent it, again be admitted to any meeting of the council.

DISCIPLINARY PROCEEDINGS

Convictions of registered medical practitioners reported to the council by the police in the normal course of administration had begun, said the President, to include far too many convictions for misuse of petrol under the Motor Fuel Rationing Orders or the Control of Motor Fuel Order. These orders are made under a defence regulation as being necessary for maintaining supplies essential to the life of the community, and offences against the regulation are therefore offences against the community. The penal cases committee of the council, before whom these and other convictions of practitioners come in the first instance, had so far only once found it necessary to cause a practitioner to be summoned to appear before the council in consequence of a conviction of this nature. But I am confident, he added, that the council will share the view of the committee that any such conviction is reprehensible in itself and derogatory to the good repute of the profession. The special privileges rightly accorded to practitioners by the state in this as in other matters imply a special responsibility not to abuse a trust.

During the session the council would be invited to consider the memo prepared by the executive committee on a proposal to establish a Register of Consultants and Specialists.

Tables prefixed to the Medical Register for 1943 showed that at the end of 1942 the number of registered medical practitioners was 69,428, and that of these 294 were temporarily registered in the Colonial List, and 1750 were temporarily registered in the Foreign List, under the emergency legislation. At the end of 1932 the number of registered medical practitioners was 56,741. There had therefore been an increase of 12,687 in the last ten years in the number of names on the register.

MEDICINE AND THE LAW

Mother attending Daughter's Confinement

THE Midwives Act of 1936 was intended to put out of business the woman who acts as a midwife without possessing professional qualifications. As a proper domiciliary service is locally provided, so the prohibition on unqualified women acting as midwives is extended, area by area. The East Suffolk public health committee has had to take note of a case where a mother, described as one of the former "handy women" who acted as midwives before professional qualifications were required, had taken upon herself the duties of a midwife in attending the confinement of her own daughter. This was technically an offence and the committee instructed the medical officer to write a strong letter of reprimand. During discussion on the case the medical officer remarked that he thought the woman had attended her daughter in order to save expense. A member of the committee declared that poor families could not afford professional fees. As was pointed out to him, however, financial assistance was available.

Hospital Rule Broken

At a recent Kettering inquest it appeared that a baby, four days old, had died after a junior sister in the maternity ward of a hospital had administered chloral hydrate. The mother had fed her baby at 10 PM; it started crying afterwards, and towards midnight the sister decided to give it chloral as a sedative; the dose was stated to be two grains. Early next morning the house-surgeon was summoned because it was clear that there was something wrong. The baby was in a state of coma from which it could not be roused. The death led to the inquest. Evidence was given that the hospital rules forbade any member of the staff, trained or untrained, to administer a drug unless it was entered on the case-sheet by the medical officer. The only exception related to trained midwives using drugs with which they were trained to deal. After giving the chloral hydrate the sister had signed the book.

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She had, it appeared, had five years' training elsewhere before going to this hospital. The jury added to its verdict of death by misadventure two riders. One recommended the reconsideration of the rule made by the Central Midwives Board (E 10b) as to the administration of drugs. The other recommended that the staff of the hospital be made to learn the hospital rules. Unfortunately a knowledge of the rules does not ensure strict and unvarying obedience.

In England Now

A Running Commentary by Peripatetic Correspondents

THE older I grow, the more dubious I become of my ability to examine for the finals with efficiency and justice. This is perhaps the proper expectation, the usual experience in all professional matters as cocksureness is slowly replaced by wisdom. It seemed so much easier when I started fourteen years ago. Then I chafed impatiently over the comparative leniency of my senior, whom I regarded as a soft-hearted old fool. Now that I myself have reached the stage which, with the modern curse for abbreviations, would be called the SHOF, I can see how much I owe to what was clearly his superior judgment in assessing the reasonable expectation for an aspirant to qualification, how much to allow for character, the reaction to ordeal, and so on. Yet I become increasingly doubtful of my own capacity, of the value of examinations generally, and of the best way in which examinations should be conducted.

I am, I recognise, a bit of a heretic. My colleagues prefer their questions to be based on plain straightforward textbook exposition. They like, for example, to ask for the signs and symptoms of a tumour of the brain. They are entitled to expect the answer to come pat, nine times out of ten: headache, vomiting and optic neuritis. (The tenth candidate is one of those unfortunates whom the sight of the examination table smites with complete mental paralysis.) I prefer to put a problem. "A mother brings to you a child of 8 who has suffered from chronic headache for the past two months. What possible causes of such a symptom first occur to you?" The textbook man can think of nothing but cerebral tumour and meningitis. I point out that although it is right and proper to remember the possibility of cerebral tumour, this happily is a very rare condition and that it is best to think first of common things. And only by patient coaxing can one lead him in the direction of errors of refraction, of bad hygiene, of anxiety over school, and other commonplaces. My colleagues ask for the causes of hæmoptysis. The appropriate gramophone record is selected and placed in position, and out comes the list which has been conveniently prepared by the authors of our excellent textbooks. I prefer to ask for the causes of hæmoptysis in a girl of 12. The candidate is bewildered: at this age can hæmoptysis be related to mitral stenosis or pulmonary tuberculosis? Such a trifle as adenoids does not loom largely enough, but paragonimiasis springs to the lips and—this is a safe bet—vicarious menstruation. My colleagues ask for the normal percentage of calcium in the blood, the characteristics of the cerebrospinal fluid in various conditions, the treatment of gastric ulcer. I prefer to inquire about the treatment of obesity; and since emphasis is always laid upon the provision of exercise, I inquire how far the candidate supposes one must walk at three miles an hour to burn up one pound of fat. This extremely practical point is not handed to him ready made in the books. He usually hazards a distance from half a mile to five miles, and is flabbergasted to learn that something of the order of 70 miles is required.

It is easily comprehended why textbook questions are preferred by the candidate, and as a rule by the examiner. They do not call for thought, reasoning or argument. But are my colleagues right and am I wrong? What should we set out to discover? Are we to be satisfied with the exhibition of an adequate acquisition of stereotyped facts? Is it fair to expect cogent thought from a candidate in a highly emotional state? A tired and bored examiner will generally feel satisfied if he has fulfilled his duty by asking conventional questions merely to check technical accuracy of acknowledged contemporary learning. He is not required, he feels, to discover if the candidate is competent to apply this knowledge to the problems of humanity. There is at least this to be said in my favour. Rightly or wrongly we pass a man who knows all the answers even if we are convinced that he will not make an efficient practitioner. On the other hand, we feel kindly disposed to the poor examinee who shows common sense and a capacity to apply his knowledge, and are lenient to his academic deficiencies because we are convinced that he has the right temperament for his chosen profession. And still I doubt. I suppose we have to accept the disadvantages of examinations—their failing to provide a universally satisfactory test—and yet on the whole they work out well and there is no superior substitute, nor ever will be.

I have little hope that candidates can be persuaded that the oral examination which inspires such terror is an opportunity for the examiner to act not as *advocatus diaboli*, as they suppose, but as *amicus curiæ* or even prisoner's friend. In every question he looks for the hook sticking out through the bait, and answers are therefore couched in irritating qualifying phraseology to provide a silver bridge if retreat becomes necessary. He regards himself as in the ring, an amateur feather-weight against a heavy-weight professional pug, and one, moreover, who disregards all the Queensberry rules and is up to every sort of dirty trick. There is the additional handicap that his opponent is also the referee. The best, he thinks, is to go into a clinch until the gong sounds and hope for a draw. If he must maintain this metaphor, let him visualise a good-natured pro who while knowing that it is excellent to have a giant's strength also appreciates that it is tyrannous to use it like a giant, who would far prefer him to venture on out-fighting and will bear him no malice for an occasional honest smack.

I imagine that as the candidates congregate outside and discuss their prospects they pray that their fate may be in the hands of old Softleigh, and that they will escape an encounter with that notorious perisher Blunderbuss-Bore, who, if he is ever elevated to the peerage, will surely take as his title Lord Bayne of Examinees. For Softleigh is all encouragement with his "Good, good, very good, *jolly* good." And Blunderbuss-Bore rants at anybody who uses the timid adjective "slight"; will sarcastically observe to your halting intention to "make a careful examination" that you may assume that in all your dealings with patients you exhibit extreme care; and, scowling at your proposal to "do a PR," remarks that he will charitably presume you mean that you will make a digital examination of the rectum. They do not know that Softleigh is a wolf in sheep's clothing, whose economy in respect to marking amounts to parsimony, while Blunderbuss-Bore is a sentimentalist who, on the rare occasions when he ploughs anybody, lies awake half the night remorselessly examining his conscience.

What is one to do with illegible writing? I feel sure that the worst writing in our student days must have been copper-plate in comparison with the appalling scrawl we encounter in many or most of the examination papers at the present day. (I have long since given up worrying over the composition and spelling.) The first impulse is to throw the horror away with a devastatingly low mark. Yet better counsel prevails. The examiner may recall that his own script is not beyond criticism. In any case, he reflects that penmanship is no necessary requirement for ability and success in a doctor. Indeed, the aspirant may have been impressed by the traditional expectation of illegibility in all a doctor's written productions. And so out of all proportion to the occasion one sometimes has to translate what amounts to a cipher word by word, maddened by the time-consuming wearisomeness. And there is this uneasy reflection. To give illegibility the benefit of a doubt is to put a premium on slovenliness. On the other hand, the candidate with clear bold graphology not only receives no extra marks on this account but may find his very virtue a liability since the ease of scrutiny makes any mistakes only too easily recognisable.

* * *

"When do you think the war will end?" my husband asked me the other day. "Heaven knows. What do *you* think?" "It depends on the day of the week," he said. "Every Monday I know it will end in 1946. Every Monday night I take two of your Gregory powder tablets. On Tuesday the war is always going to end in 1945. On Tuesday night I take another tablet. The invariable

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date on Wednesday is 1944; and at bed-time, I take one more. Thursday shows 1943 a certainty. I decide to give up drugging myself and my resolution is confirmed when Friday still records 1943. Week after week it's the same story: Saturday slips back to 1944, Sunday says 1945, Monday—I've said Monday already." I laughed. "Which is the Real Me?" he asked plaintively. "And which one of me makes the correct judgment?" A bloke with as complex a personality as his may well ask. Pyknic in build, displaying the alternations of wit and high spirits with seriousness and gloom which are characteristic of this make-up, and yet also with the shyness and sensitivity and musical and artistic ability which we associate with the schizoid, which mood best represents what he calls the "Real Me?" All, I say. But he resents the fact that he can be so swayed by physical influences, endocrines, infections, the state of his bowels, a sleepless night.

* * *

All we GPs want after the war is to live like dentists—to be protected from the hard world by a pink and white barricade of lovely receptionists; to have fixed hours from 9 till 5, with time off for lunch, no work at night or on Sunday or Saturday afternoon; to tell Mrs. Smith when she rings up to say that labour pains have started that we can see her next Tuesday at 11.30; to disappear at the end of the day leaving complications to the chemist, as the dentist leaves his beastly bleeding tooth-sockets to me, who have no more responsibility for them than I have for the vet's impacted lambs. That's the life. But perhaps I shall feel differently after Tuesday, when I have had this molar out.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

DISCUSSION on the second reading of the Finance Bill translated money values into human and nutritional values in a new way. Mr. Pethick Lawrence, speaking for the Labour Party, drew attention to the two kinds of "tickets" in circulation. One is called pounds shillings and pence, the other is called coupons, and the second kind of ticket is more equitably distributed than the first. The amount of milk consumed per head of the population is greater than ever because it is not something of which you get as much as you pay for in money but of which you (or your children) get what they need by special rationing arrangements—in fact by a kind of credit coupon. But these arrangements, good as they are in maintaining reasonable standards of nutrition, do not go far enough. The standard of life, said Mr. Pethick Lawrence, "has to be made more equal throughout the population." How to do this after the war may well be a major issue in the political parties, and when the Chancellor broadened the basis of income-tax to include 7 million people he gave 7 million people a keen and personal interest in financial problems.

On the following day the House considered the refugee problem dealt with by Mr. Peake, the under-secretary for the Home Department, who met the USA delegation at Bermuda. The problem is world-wide. There are 4 million refugees in India, 300,000 Jewish immigrants have entered Palestine since 1919, East Africa has taken in many war refugees and there are 40,000 Polish refugees in Persia. For all of these the British Government has large responsibilities. But there is no possibility of "rescue" on a large scale and some of the criticism of the Government has been based on inaccurate information. Much that affects refugees cannot be stated in public or it may bring further evil on those we wish to help. The Bermuda conference surveyed the situation and some improvements can be made, but with wholesale massacres of Poles and Russians and with the Nazi terror against the Jews the only real remedy will come with victory. Prof. A. V. Hill, who was critical of the Government's attitude and their lack of warmth in the approach to the problem, thought that all that could be done was pitiably small, but we might get away from Hitler's Europe some tens of thousands of people.

But the rescue operations were only a beginning. "The much greater task lying before us," he continued, "is of restoring shall we say 50 million refugees to their homes all over the world. . . . In that task the British Commonwealth and the United States will be working together . . . In trying to do an honest job together we can learn to understand and appreciate each other better than by arguing politics."

The next day the House turned its attention to a bill making some relatively small improvements in old-age pensions. It was symptomatic of the uneasy feeling that is growing stronger in the House that the old people are having rather a raw deal. Such debates are "softening" operations, to use the military phraseology, and presage a more active advance towards the main line positions of the Beveridge and other big scale reports.

WELSH HEALTH SERVICES

In the House of Lords on May 18 Lord DAVIES asked HM Government whether, in view of the special conditions obtaining in Wales, they would take steps to appoint a Welsh health services medical advisory committee following the recent creation of similar committees for England and Scotland.—Lord SNELL replied: The Minister of Health is responsible for the health services in Wales no less than in England, and the committee appointed in November last to advise him on the medical aspects of problems affecting the health of the people is equally concerned with both countries. The committee accordingly includes two members with special experience of Welsh conditions, and no separate committee appears to be necessary.

QUESTION TIME

Famine Relief

Sir FRANK SANDERSON asked the Parliamentary Secretary to the Ministry of Economic Warfare whether he would permit dried milk and vitamin concentrates to be sent to Greece, France, Belgium and Poland to provide children under 16, nursing and expectant mothers with a daily ration sufficient to ward off the worst deficiency diseases; and was he aware that the money, supplies and shipping were available and that the International Red Cross would be able to provide for full control of the distribution.—Mr. D. M. FOOT replied: As regards the shipment of milk and vitamin concentrates to Greece, I would refer to my answer on May 11. Otherwise the policy of HM Government remains as laid down by the Prime Minister on Aug. 20, 1940. After the fullest consideration and with the deepest sympathy for the Allied peoples of Europe in their sufferings under German rule, HM Government are convinced that a general action of the kind described would inevitably be exploited by the enemy for his own advantage. Moreover, such action could hardly be confined to the countries named in the question, and the provision of foodstuffs for children and nursing and expectant mothers throughout Occupied Europe would involve a very serious breach in the blockade. I regret, therefore, that except for Greece the answer to the first part of the question must be in the negative. As regards the second part of the question, no information has been received by HM Government to show that money, supplies and shipping are now available for this purpose. Nor does there exist in France, Belgium or Poland any machinery of control which we could possibly accept as adequate. As I have frequently pointed out in answers to questions on this subject, neutral control of imported foodstuffs is an insufficient guarantee unless it is accompanied by control over the domestic food-supplies of the countries in question.

Sir F. SANDERSON: In view of the fact that vitamins and dried milk could only be used for expectant mothers and children, is it not a fact that they could be of no value to the enemy?—Mr. FOOT: I do not agree. Local supplies of milk are one of the commodities which the German occupying troops are most liable to seize, and if we sent in any substantial quantities of dried milk we should merely be adding to the pool of foodstuffs available to them.

Venereal Diseases

Dr. E. SUMMERSKILL asked the Minister of Health whether, in view of the fact that only one man and 27 women had been treated under regulation 33B, he would now consider the introduction of compulsory notification in order effectively to reduce the incidence of venereal disease.—Mr. E. BROWN replied: No. The numbers mentioned refer to persons so far reported from more than one quarter as alleged sources of infection, and the figures are not in themselves a true criterion

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of the efficacy of the regulation, which it is already evident is indirectly doing much to help in getting infected persons to undertake voluntary treatment.—Dr. SUMMERSKILL: In view of the fact that this disease is a great menace to public health, will the Minister say how serious the incidence of venereal disease must become before he will introduce effective measures?—Mr. BROWN: I have promised the House that if in the light of the working of regulation 33B I find it necessary to ask for further powers I shall not delay taking action, but we ought to have time to see how it is working because I am sure the House does not want compulsion for compulsion's sake.—Sir A. KNOX: Is not the issue of this regulation merely trifling with what is really a terrible problem?—Mr. BROWN: I would not agree. Those who are administering the regulation locally in certain difficult places do not take that view.

Issue of Sulphonamides to Soldiers

Sir J. GRIGG replying to a question, said: I am informed that drugs of this type were issued to American soldiers in Africa. These drugs are not issued to individual soldiers in the British Army, but medical officers hold the necessary stocks of them. I must say that I am prima facie indisposed to distribute these drugs broadcast among the troops without control.—Sir FRANCIS FREMANTLE: Is there not considerable danger in self-medication? No further reply was given.

Special Diets Committee

In answer to a question Sir JOHN ANDERSON, Lord President of the Council, stated: The Food Rationing (Special Diets) Advisory Committee of the Medical Research Council has held 14 full meetings. Owing to the decrease in the number of questions referred to the committee, and particularly of questions involving new principles, it has not so far been necessary to convene a full meeting in 1943 although a sub-committee has met. Minor questions arising between meetings are circulated in the form of memoranda and the opinions of members obtained in writing. The other bodies consulted on behalf of the committee since the beginning of this year, in addition to Government departments specially concerned, are the Royal College of Obstetricians and Gynæcologists, the Joint Tuberculosis Council and the Tuberculosis Association.

Diphtheria Immunisation

Replying to questions Mr. BROWN said the numbers of children immunised against diphtheria under local-authority arrangements in England and Wales up to Dec. 31, 1941, were approximately 547,000 under five and 1,818,000 between the ages of five and fifteen. The corresponding figures at June 30, 1942, were 725,000 and 2,114,000; and at Dec. 31, 1942, 1,150,000 and 2,598,000.

Returns from local authorities show that the number of notifications of diphtheria among children under fifteen during 1942 in England and Wales was approximately 28,500, of which about 87% were cases of non-immunised children.

Factory Hours for Young People

Mr. W. GALLACHER asked the Minister of Labour the number of factories and other places, coming under the Factories Act, 1937, which applied for and received permission to extend the hours of work for young persons by virtue of the General and Special Emergency Orders during the years 1940, 1941 and 1942.—Mr. ERNEST BEVIN replied: This information is not available. The approximate number of premises at which emergency modifications of the provisions of the Factories Act as to hours of women and young persons were in force was 6500 at the end of 1940; 11,000 at the end of 1941, and 19,000 at the end of 1942. In many of these cases only women over 18 are affected but I cannot give the figure, and the hours authorised are often shorter than could be worked under the ordinary law.

Factory Accidents

Accidents reported under the Factories Act were 1104 fatal and 192,371 non-fatal for 1939; 1372 fatal and 230,607 non-fatal for 1940; 1646 fatal and 269,652 non-fatal for 1941; 1363 fatal and 313,267 non-fatal for 1942. The percentage of such accidents to the total employed was roughly 3·4 in 1940 and 3·8 in 1941. (Mr. BEVIN replying to Mr. RHYS DAVIES.)

Cripples and the Beveridge Plan

Mr. J. LITTLE asked the Minister of Health whether, when the Government was considering the question of sickness and invalidity benefits in connexion with the proposals in Sir William Beveridge's report, sympathetic consideration would be given to the claims of cripples and disabled persons who were ineligible for health insurance benefits and had not reached the age for old-age pension, for adequate provision to meet their needs.—Mr. BROWN replied: Yes. I recognise that the position of these classes of persons will need special consideration.

Dental Treatment for Service Men's Dependants

Mr. JOHN DUGDALE asked the Minister of Pensions whether he would consider the possibility of paying the cost of dental treatment for dependants of serving men on the same scale as payment for medical treatment.—Mr. W. PALING, parliamentary secretary to the ministry, replied: Assistance in respect of dental treatment is already given under the scheme of Emergency Grants explained in Command Paper 6318 of 1941 where such treatment is necessary for the relief or cure of a serious and prolonged illness resulting in a financial emergency in the household. The scheme does not cover other types of illness and there are no grounds for making an exception in respect of general dental needs.

Alien Doctors and Postwar Appointments

Mr. HANNAH asked the Minister of Health if he could make any statement as to the policy of the Government for the future of alien doctors allowed to practise under restrictions in this country for the duration and anxious, if possible, to continue to serve here or in the Colonies.—Mr. E. BROWN replied: No. As my hon. friend is aware, the present arrangements under which certain medical practitioners are temporarily registered under the Medical Acts by virtue of foreign qualifications will cease with the lapsing of the Emergency Powers under which they are made.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED MAY 15

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1748; whooping-cough, 2106; diphtheria, 602; paratyphoid, 4; typhoid, 4; measles (excluding rubella), 8032; pneumonia (primary or influenzal), 712; puerperal pyrexia, 169; cerebrospinal fever, 62; poliomyelitis, 8; polio-encephalitis, 0; encephalitis lethargica, 4; dysentery, 98; ophthalmia neonatorum, 78. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on May 12 was 2014. During the previous week the following cases were admitted: scarlet fever, 154; diphtheria, 40; measles, 137; whooping-cough, 38.

Deaths.—In 126 great towns there were 1 (0) deaths from enteric fevers, 1 (0) from scarlet fever, 11 (1) from measles, 11 (2) from whooping-cough, 12 (1) from diphtheria, 41 (9) from diarrhœa and enteritis under two years, and 22 (3) from influenza. The figures in parentheses are those for London itself.

Hendon reported the fatal case of an enteric fever. Birmingham had 5 deaths from diarrhœa, no other great town more than 3.

The number of stillbirths notified during the week was 239 (corresponding to a rate of 35 per thousand total births), including 21 in London.

DIETETICS IN WAR

A BOOKLET [1] first published in 1935 and setting out diets used in treatment has now been revised for war-time conditions. Much work has gone to their compilation. Food-supplies these days are so variable and uncertain that what is advised at one time may be out of date a few months later. This unfortunately has happened to some of the diets given here, but nevertheless the book shows how the principles of dietetics can be maintained in spite of restrictions and regulations. The section on diabetes belongs rather to 1935 than to 1943, and the diets given are disappointing, because besides being difficult to carry out in practice they are not easy for the patient to manage at home. The booklet might be improved by some brief notes on the blank pages opposite each diet, indicating how any particular diet will be linked up with the progress of the disease. On the whole it should be useful to those needing dietetic advice who are unable to call on the services of a qualified dietitian.

1. War Time Diet Book. Issued by the David Lewis Northern Hospital, Liverpool. Pp. 49. 5s.

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Letters to the Editor

THE BURN AS AN OPEN WOUND

SIR,—May I offer the following comment on your leading article of May 15?

1. To begin with its last sentence: if we wait to tackle the problem of infection in burns till we know which is the most likely source of that infection, we may wait for 50 years or perhaps for ever. There is good evidence to support the belief that infection may and does occur from all three sources—the respiratory tract of surgeons, nurses or patients; the hands or instruments of dressers; and the infected air and dust of the ward. The relative importance of each of these sources will vary with circumstances—e.g., if there is a nurse doing dressings who happens to be an abundant throat or nose carrier of hæmolytic streptococci, the opportunities for dissemination of that microbe by her may well overshadow those from the dust or from faulty dressing technique. Similarly, if the ward dust is heavily contaminated, or flies are numerous, or blankets are not sterilised, a strict dressing technique may often fail to prevent infection. I suggest that the control of infection in surgical wards, and especially in wards full of burns, is always going to be so difficult that we cannot afford to ignore any of these sources, but must reckon with all of them in our counter-measures.

2. You suggest that the burned patient does not constitute a special problem and that it may be unwise to segregate such patients in a special ward "unless a very high surgical and nursing standard can be maintained to minimise cross-infection, or there are more facilities than exist at present for the isolation of infected cases." It seems to me that the burned patient does, in fact, constitute a special problem just because his large exposed surface renders him far more liable to infection than most other injuries; and that the time has come for us to aim very definitely at this "high surgical and nursing standard" (plus isolation facilities) which are essential if we are to make progress towards the aseptic repair of the deep burn.

Until five years ago it seemed an impracticable ideal to keep a deep burn of any size uninfected through the long weeks of healing, but with the coming of the sulphonamides and penicillin, and recognition of the importance of hospital infections, new possibilities are rapidly coming into view. It is already clear that infection can be, to a very large extent, eliminated if we see to it that burns are treated *under the right conditions*. This is not the place to discuss those conditions in detail—a report dealing with them will be sent shortly to the burns committee of the Medical Research Council. To get and maintain them will be a much more difficult job than the building up of a satisfactory aseptic and antiseptic ritual for the operating-theatre—a task which took some 30 years and is not yet completed. It is not to be expected that the right conditions will be obtainable in the ordinary surgical wards of most hospitals; nor will real progress be made by those who are treating only a few burns each year. The new developments, in regard to both the control of infection and the treatment of the so-called "shock" state by serum or plasma (which seems unlikely to be reducible to a simple rule of thumb), call for a policy of aggregation of our burned patients in centres specially staffed and equipped for their treatment. When that policy is adopted—and not till then, I think—we shall be able to secure the best treatment for severely burned patients. A very strong case can be made out in this instance for special centres.

3. Finally, one point of detail: your leading article gives the impression that, in the initial cleaning-up of the burned area, the chief value of CTAB is as a detergent—to get rid of grease and dirt—and not as a disinfectant of the surface. Our experience, based on bacteriological tests with some hundreds of cases before and after cleaning up burned surfaces with CTAB, seems to show clearly that this substance is extremely effective as a *sterilising agent*, except when many hours have elapsed since the injury and streptococcal infection of the tissues is already established. In these circumstances it does little, but for the fresh burn it is probably the most effective agent we have at present. That acriflavine may fail us as a steriliser of the burned surface was well shown by the following case. A patient received a severe burn of the forearm and hand at 8 PM. It was thoroughly treated with acriflavine and effectively covered with dressings at about 9 PM. Three hours later, on arrival at the hospital, hæmolytic streptococci were cultivated from the burned area.

Glasgow. LEONARD COLEBROOK.

EVALUATION OF GASTROSCOPY

SIR,—While I would be the last to cast doubt on the value of gastroscopy in selected cases provided the examination is carried out by experienced gastroscopists, it is clear that the number of medical officers in the fighting services who have extensive experience of gastroscopy is negligible. Schindler has written that gastroscopic reports by an operator who has done less than 300 examinations are of no value. Indeed it is clear that the findings of the amateur gastroscopist are worse than useless, as they serve only to mislead. I therefore feel most strongly that this investigation is one which should be forbidden in Service hospitals, except in the rare instances where the services of a real expert are available, who not only recognises what he sees but is able to judge when a gastroscopic examination is required.

In the Services patients with dyspepsia should not be admitted to hospital unless their condition is such that hospital treatment is clearly essential. All necessary investigations can be carried out in the outpatient department, as is almost invariably the case in civil hospitals, and only those patients who require strict dietetic and medicinal treatment need be admitted. If a gastroscopy comes to be regarded as a necessary procedure in the investigation of every suspected peptic ulcer every case of dyspepsia will require admission.

Over-enthusiasm is characteristic of the young, and most specialists in the Services are young. Without wishing in any way to discourage initiative and enthusiasm I feel that these admirable qualities need to be kept within bounds, particularly in regard to gastroscopy.

Guy's Hospital, S.E.1. J. J. CONYBEARE.

REHABILITATION OF THE TUBERCULOUS

SIR,—I am concerned about your recent remarks on the tuberculous. You say (May 8, p. 587):—

> "Experience of routine examination of one group of the population, students in training at a hospital—a heavy and exacting life—has shown that it is rarely necessary to send the 'positive filmer' to a sanatorium."

Presumably you were referring to cases with no clinical signs or symptoms. You imply that if some modification of the student's life can put him on top of his disease the same applies to all apparently early cases.

How different are the actual facts. In an industrial area—for example, where coal-mining is the usual occupation—there can be no modification of the patient's working life. Easy jobs are hard to come by and the patient's training has not fitted him for any other employment. Further, I venture to state that there is no surplus of easy jobs to be had for the asking. Yet the majority of cases of tuberculosis will permanently have to lead a modified form of their previous existence. if they are to get the maximum benefit from any treatment.

Most people, many of them doctors, think that any case of tuberculosis should recover completely with treatment, and show a return of full working capacity in time. The truth is that any case may become *arrested*, but often such cases only remain apparently healed if the person leads a leisurely existence. Only a guarded prognosis can be given in most cases, and the Ministry of Health memorandum (37T revised) expects a case of pulmonary tuberculosis, apparently healed, to be kept under supervision for 5 years. Relapses are common unless fibrosis and calcification occur, and research shows live tubercle bacilli in 30% of calcified foci.

It was left to one man, and one man only—the late Sir Pendrill Varrier-Jones—to realise that a tuberculous patient requires to live and work always under ideal conditions, and that his return to work must be very gradual. In the village settlement, the type of work is

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suited to the patient's condition, and I am surprised that the national scheme does not include the establishment of such centres in each area of population over, say, half a million.

One in 200 suffers from tuberculosis, one in 7 over the age of 45 dies from it. Why not make a clean sweep and do the job properly? Payments to tuberculous patients will not cure them.

Pontefract. CLARENCE PONIEDEL.

*** We were referring to a pioneer experiment in voluntary periodic radiography of students under training at a London medical school. Out of a total of 417 students examined (98% of all attending) 26 showed pulmonary lesions considered to have importance, in 17 of whom the lesions were believed to have had their onset during the clinical course. Of the 26 "positive filmers" 18 were advised to continue work, 4 of them under restriction, and their progress was satisfactory; 8 were advised sanatorium treatment and when the report appeared 4 of them had already returned to work and qualified. These are "the actual facts." We used them as an illustration of the good news that pulmonary tuberculosis if discovered early does not necessarily imply sanatorium treatment. It may yield to less exacting measures. The adjustment required in any particular career still needs to be worked out. Of this we have little experience, for diagnosis by signs and symptoms did not lead to the early discovery of disease which is the reasonable promise of mass radiography.—ED. L.

FORMATION OF RED BLOOD CORPUSCLES

SIR,—Dr. Duran-Jorda (*Lancet*, April 24) states that:

Vascular tumours such as angiomas . . . give an example of local blood formation; it is well known and accepted that these tumours have no connexion with the general circulation.

He asserts that the red blood corpuscles in angiomas, &c., are not derived from the general circulation but are locally produced. Is there any foundation for the statement that angiomatous tumours have no connexion with the general circulation? I believe it is based on a misapprehension of Ribbert's observation that an angioma has no intimate lateral anastomoses with the vessels of the surrounding tissues. In this sense an angioma is a closed system; but surely there is sufficient evidence, both clinical and anatomical, that it does possess afferent and efferent vessels (as Ribbert[1] himself showed by his injection experiments), and being thus in direct communication with the general circulation derives from that source the red blood corpuscles found within the tumour.

University of St. Andrews. G. R. TUDHOPE.

HEALTH IN THE NURSING PROFESSION

SIR,—Hardly a week passes but a fresh call comes from authoritative sources for more recruits for nursing services. Even the Throne has uttered it. Why is the public deaf?

It seems to come to this. We shall not get an adequate service on volunteer lines unless we recondition the industry from the foundations. The suggested tinkerings are not enough. We have remained obstinately blind to the outstanding stumbling-block—viz., the menace to health involved in the employee-cum-student status of the nurse in training. Yet we have only to look back a few years and read the lesson from educational history. We could not staff elementary schools with pupil-teachers; we cannot, today, staff our hospitals with student-nurses. Parents will never encourage their precious young to enter the out-of-date regimen of hospital life. Why, alone among working conditions, should the double burden be borne of full-time paid employment plus the student's life?

The findings of the Rushcliffe Committee actually worsen the situation by emphasis on the employee aspect through allotting higher pay to the raw recruit. The over-hard conditions of the nurse's dual life is a matter of general knowledge, but the one practical suggestion made by nurses themselves to counter the evil has received little popular attention. The block system of training by alternating study periods with weeks of ward work bears some comparison with the engineering preparation of "going to the shops." If it also carried a similar freedom from earning a living by services rendered it might prove more acceptable—or at least a step in a wider plan.

It is a gruesome indictment of the intelligence of us all—medical, lay and nursing alike—that we cannot read the writing on the wall when we come to administer our hospitals.

Northwood, Mdx. ESTHER CARLING.

1. Ribbert: *Virch. Archiv*, 1898, **151**, 381.

FUTURE OF MEDICAL SERVICES

SIR,—I shall be grateful if you will permit me to explain why it is essential for the control of the health services to be in the hands of a National Corporation (I prefer the word Guild) on a regional basis, and not in those of the local authorities on a local basis.

Let me first state baldly that the Government's wish to give the local authorities all the health services to administer is the expression of its failure (through lack of moral courage and fear of electoral consequences) to stand out for the general establishment of regional government as a permanent measure, with an accompanying revision of the functions and boundaries of the present local authorities. It is widely admitted that the present areas are too small and lack uniformity; it is also generally admitted that local government planned on a regional system is likely to be more efficient, provided that it is built up from the bottom and not stuck on from the top by merely appointing regional commissioners from Whitehall. Whenever war comes along and real efficiency is necessary for survival we turn to the regional system, yet on the advent of peace the local authorities are given back all their beloved and jealously guarded powers. If at the end of this war we are going back to prewar local government and not develop further the regional idea, then let us frankly admit that democracy in this country means the triumph of moral cowardice and administrative ineptitude.

If, on the other hand, we have the courage to progress with the regional system—several districts comprising a region—then the regional medical officer (who would also be the regional medical officer of health) would administer all the health services, including hospitals, for his region through the regional medical committee which would draw its members from the various district medical and hospital committees. A certain agreed number of local lay government officers would sit on each committee—a reciprocal arrangement by which a few doctors would sit on committees for housing, roads, &c. The central or national medical committee, to be drawn from the regional committees by election, in association with the Ministry of Health would administer the finances, granting to each region the necessary monies to run all the health services. This money, partly raised by a capitation fee and partly granted by the Government, would be found annually by means of a medical vote in the House of Commons. In this way only will the medical profession remain an autonomous body, retain its dignity, and have the necessary power and weight to express its opinions satisfactorily on matters of health.

If the Government has its way and leaves the present so-called environmental medical services in the hands of the local authorities and also gives them all other health services to administer, then indeed shall we become the servants of the local lay committees; and only those who have worked in municipal hospitals and in other local government medical services know what that means. It means that we shall lose our position as sages and find ourselves labelled Clerks (M) to be transferred or dismissed at the whim of our lay masters. It means that we shall be split up and have no strong unified voice on matters of health or policy. It means that we shall have to beg for the money for a much-needed extra wing of a hospital from a local authority which prefers to gain local popularity by building something more spectacular such as swimming baths or a block of flats.

Such are the alternatives ahead of us. Let us therefore choose the National Corporation on the regional basis, and let us acquaint the Government in no uncertain terms of our choice. By this means only shall we remain both the servants of the public and our own men.

Edinburgh. SHAKESPEAR COOKE.

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EMERGENCY BED SERVICE IN LONDON

SIR,—The exigencies of war have probably affected the medical profession more than any other; general practitioners in many cases are doing double duty and it is important that measures which save them time and trouble should be brought to their notice. Owing to changes among the personnel of London doctors a number of them are unaware of the facilities provided by the Emergency Bed Service. For their benefit the following brief particulars may be helpful.

The EBS is financed by King Edward's Hospital Fund for London on behalf of the voluntary hospitals and arranges for the admission to hospital of urgent cases but does not deal with waiting-list cases. As it keeps a running record of available beds, it is able to give immediate advice to doctors as to which hospitals are likely to be able to admit their patients. The doctor decides which of these hospitals he thinks most suitable, the EBS then rings the hospital and books a bed; and when necessary arranges for an ambulance to collect the patient. Thus doctors obtain the admission of their patients to hospitals of their choice by making one telephone call and are saved the possibility of many unnecessary calls to hospitals which have no empty beds. In the five years in which the EBS has been working no suitable case has been refused, some 22,000 having been admitted through the service.

At present the Emergency Bed Service is open from 9 AM to 8 PM daily, including Saturdays and Sundays; after June 1 it will remain open till 10 PM. The telephone numbers are City 2162 and Clerkenwell 6571.

H. WERNHER,
Chairman.

10, Old Jewry, E.C.2.

HOSPITALS AND DEBT

SIR,—I have been concerned at references made, by people in official or semi-official positions and by ordinary citizens, to the state of debt in which most of the voluntary hospitals find themselves. In some instances this reference is not made thoughtlessly but subtly and conveys the suggestion that this financial state is due to incapability to manage affairs, want of foresight or thriftlessness.

Unfortunately the voluntary hospitals have made use of the simple fact of debt as a means of appeal which they felt would be appreciated in its proper perspective by the public. When the state had no general hospitals for civilians, the local authorities had few, and when many of the poor law hospitals were for various reasons unsuitable, the voluntary hospitals regarded their self-imposed responsibilities seriously. So seriously have they interpreted their relationship and responsibility to the public that they have felt impelled to overdraw their bank accounts. This was not done in a thriftless or improvident manner but after due deliberation.

Unfortunately subscribers to voluntary hospitals have not realised sufficiently clearly that essential improvements in or extensions of hospital accommodation and the ever-increasing need for expensive medical and surgical appliances cannot be provided without a corresponding increase in subscriptions. In other words the governing bodies of the voluntary hospitals have been much more foresighted and sensible of their responsibilities than the public to whom they look for support.

Local authorities may never be in debt, for the simple reason that they have the right to dip their hands into the citizen's pocket. When the two systems of hospital finance are compared and in one a debit balance is found it must be remembered we are not dealing with questions of good or bad management, thrift or improvidence but with the ease or difficulty with which money is obtained from the citizen.

The citizen is liable to regard the question of debt in simple, homely terms. It may be that he compares his own sound financial position with that of some notoriously thriftless neighbour. This leaves the mind open to the doubt (which may be subtly suggested in certain quarters) as to whether the voluntary hospitals are really capable of managing such large and important concerns properly. But whatever the faults of the voluntary hospitals (for they vary and have faults just the same as hospitals under different control) they are not in debt in this sense.

Is the issue of shares or a loan to be regarded as evidence of debt through incapability or thriftlessness in the case of big business, local authority or the Government? The voluntary hospitals have paid very large dividends in service and in the advancement of medical science and this is the security which they offer to the citizen when they appeal for funds.

I would like to draw attention to debts which have never been discharged. In course of conversations with citizens of all classes surprise has been expressed at the fact that the voluntary hospitals are not and never have been in a position to receive payment for the treatment of contributors to the national health insurance. Has it ever been computed what the voluntary hospitals have spent in hard cash to make up for this grave and acknowledged deficiency in the act? Has the cash value, to the reserve funds of insurance companies and friendly societies, of the life-saving and reduced sick benefit periods which result from the activities of the voluntary hospitals ever been assessed? With this in mind we may well wonder why the voluntary hospitals never drew attention to such obvious sources of expense and of funds.

Surely the spirit and intention behind the Local Government Act of 1929 and the Cancer Act of 1939 is to bring in the local authorities to support, relieve and extend the work commenced and developed by voluntary effort and service.

WHATELY DAVIDSON.

Newcastle-on-Tyne.

DOCTORS AND THE FUTURE

SIR,—The resolution quoted by you from the Manchester and Salford practitioners "carried unanimously and with acclamation" and calling for the institution of a Royal Commission to consider the future of medical practice, reinforces the demand, also carried with acclamation, by the great meeting of doctors on May 16. No mention is made of this demand in your report of the proceedings of the Representative Committee which had also urged the appointment of a Royal Commission. Perhaps I may be allowed to point out that I made this request in a letter to the *Times* of Feb. 6, 1941, and in a parliamentary question addressed to the Prime Minister on Jan. 21, 1941. The present position, as recorded in your report, is apparently that the Minister of Health agrees to discard his previous proposals and to re-examine the whole position. It is becoming more and more obvious that no settlement can be satisfactory unless it is agreed by all parties concerned with the problem, and I submit again that a Royal Commission is the most authoritative body to examine the whole position in the light of evidence submitted to it by all the parties concerned. I am accordingly repeating my request of 2½ years ago in the following form:

> Sir E. Graham-Little.—To ask the Prime Minister whether, in view of the resolution forwarded to the Minister of Health on May 12th by the Medical Representative Committee and subsequently acclaimed by a meeting attended by about a thousand doctors, declaring that the only really effective way to deal with the problem of future medical practice was to place it before a Royal Commission, he will now take steps to appoint such a commission.—(May 24, 1943.)

E. GRAHAM-LITTLE.

House of Commons.

*** The "great meeting of doctors" to which Sir Ernest refers was a meeting of the metropolitan counties branch of the British Medical Association in London on May 16 (*Brit. med. J.* May 22, Suppl. p. 61).—ED. L.

SIR,—It is suggested that if you will look more carefully at the letter from the Bournemouth doctors you will find that it is dated 1843, and that they have landed you a swift one. That you have been the victim of a hoax is suggested not only by the wording of the letter, so reminiscent of the rounded phrases of novels like *Robert Elsmere*, but by the satisfaction with the world which it discloses. Alternatively, whilst Bournemouth may be just the sort of place to discover a case of Rip Van Winkleism it would be curious if so many cases could be found associated with one hospital.

S. W. SWINDELLS.

Grimsby.

"NATIONAL SERVICE FOR HEALTH."—This pamphlet, to which we referred in a leading article last week, describes the Labour Party's policy for medical services after the war, and is obtainable from Transport House, Smith Square, London, S.W.1, for 3*d.*, post free.

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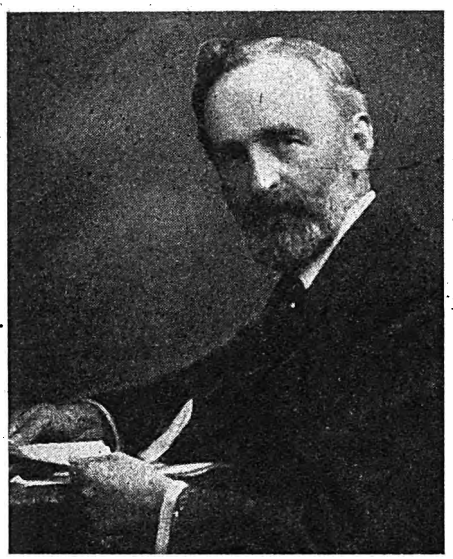
Obituary

ARTHUR NEWSHOLME

KCB, M D LOND, F R C P.

THE death of Sir Arthur Newsholme on May 17, at the age of 86, removes a landmark in our national system of public health of which he was both the reformer and the chronicler. During those eleven crowded years in Whitehall when he was medical officer to the Local Government Board, before its absorption in the Ministry of Health, the emphasis shifted from sanitation to personal hygiene. He had a vision of human lives emancipated by their own effort and he set his course to provide the conditions of healthy living.



Elliott & Fry

Arthur Newsholme was born at Haworth, and his memories went back to the 'sixties and talks with people who had known the Brontës in that West Riding town. His mother was early left a widow, and he won his way through school and college with the help of scholarships. After a year as apprentice to a Bradford practitioner he entered St. Thomas's Hospital at a time when surgery was coming to life in the carbolic spray, and where he listened to Sir John Simon's last lecture. Qualifying LSA in 1879 he was house-surgeon there and held other resident posts while he was taking the London MB with several honours and the gold medal in medicine, followed by similar distinction at the MD examination. In 1883 he was appointed part-time MOH for Clapham where he had already been in successful general practice for two years, and in 1888 after taking the certificate in public health he became the first full-time MOH for Brighton (which had just been made a county borough) at a salary of £750. Here he spent the next twenty years, and his determination to get his principles of public health established in practice, based as it was on his own experience as family doctor, soon won recognition. It was in Brighton in the year 1899 that the notification of tuberculosis (on a voluntary basis) began in this country, and it was here too that serious research started into the ætiology of rheumatic fever, of diphtheria and of summer diarrhœa. His demonstration that shellfish may convey typhoid brought him into conflict with interested parties. In the background were numerous mathematical excursions, following up his guide-book (*Elements of Vital Statistics*, 1889) and elaborating the "fallacies of observation" and the "fallacies of inference" on the avoidance of which his mind was keenly set. At the conclusion of this period the municipal council testified on vellum to "the unstinted service by reason of which a continuous and progressive decline in the death-rate has been brought about."

His translation, in 1909, to the Local Government Board came about through the wisdom and on the personal decision of John Burns, a kindred spirit in many ways. With years of experience as an MOH he was in a unique position to reconcile methods of local and central administration. Steadily, though not without heat and effort, Newsholme overcame the difficulties of an outsider entering the closed ring of the Civil Service and piloted the expansion of our public-health administration from a predominantly environmental service to a personal service of preventive medicine. On his initiative the anti-tuberculosis and maternity and child-welfare activities developed from isolated local efforts to national schemes. In 1916, on the appearance of the report of the Royal Commission on Venereal Disease, he secured the prompt adoption of nearly all its recommendations. And these were only some of the directions in which his single-minded and virile will broke down resistance and implemented wise reforms. The position of independence in which medical officers of health now find themselves, and the resulting advance in public appreciation of health services, is due in large measure to his enthusiasm and example.

Retirement from Whitehall in 1919 was not the end of his work but the beginning of a new phase. Invited by W. H. Welch to lead the new school of hygiene at Johns Hopkins he had a profound influence on American public health through professional and personal contacts with a new generation of public-health officers. His American experience, his familiarity with our own system, and his visits on behalf of the Milbank Fund to European countries and especially to Russia (cf. *Red Medicine* with J. A. Kingsbury, 1933) found expression in a series of *International Studies on the relation between the Private and Official Practice of Medicine*, written with the terse lucidity characteristic of all his reports. This experience and much else is embodied in two autobiographical volumes, *Fifty Years in Public Health* (1935) and *The Last Thirty Years in Public Health* (1936). His worth as an administrator was recognised by honours and responsibilities. He was made CB in 1912 and promoted KCB in 1917. He was president of the Society of MOHs. He sat as crown nominee on the General Medical Council from 1910 to 1919. He examined for the Universities of Oxford, Cambridge and London, and he was a member of the executive of the Imperial Cancer Research Fund.

Of the manner of man behind this achievement a few words remain to be said. During the years of struggle when he was fighting against obstruction and inertia his critical mind and caustic tongue were sometimes more evident than his generous heart, though generosity of temper and of purse was always near the surface. He had the Yorkshireman's canny delight in a good bargain, as well as some of his bias towards the material side of human welfare. His last ten years were clouded by the loss of his wife after fifty years of close companionship. But he had his library and his garden, and in his determined maintenance of interest in his fellows he triumphed over bereavement. The Worthing Council of Social Service had his warm support. During this time too he made many new friends who could testify to unobtrusive acts of kindness, to his invincible cheerfulness, to his alertness of mind, and above all to the transparent goodness which was manifest in him.

KENNETH COLE JEFFERY

D S C, M B LOND; SURGEON LIEUTENANT R N V R.

SHORTLY after winning the DSC for his work among the casualties of the Malta convoy Surgeon Lieutenant K. C. Jeffery was reported as missing, presumed killed, after the loss of HM destroyer *Partridge* in the Western Mediterranean. He had joined the RNVR in October, 1939, and seen much service at sea, taking part in the action at Narvik and in the evacuation from Andalsnes. He was born in 1909, the son of the late Surgeon Captain T. W. Jeffery, RN, and educated at Plymouth and Rochester. He graduated MB from the London Hospital in 1932 and after holding house appointments became resident medical officer at Barming Mental Hospital, Kent. In 1938 he became a partner in a general practice at Sidmouth and later was elected to the honorary staff of the Victoria Hospital there. His sound judgment, loyalty and readiness to help quickly won the respect and affection of colleagues and patients, but the outbreak of war broke off the promising work he had begun at Sidmouth.

NILRATAN SIRCAR

KT, M D CALCUTTA, D C L OXFD, LL D EDIN.

Sir Nilratan Sircar, who has died in Calcutta at the age of 81, held a foremost place there as consulting physician with wide interests. He took the lead in obtaining increased facilities for medical education and, with the

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help of other Indian leaders, succeeded during the war of 1914–18 in founding the first independent Indian-staffed medical college in Bengal. The Carmichael Medical College, so named after the then governor of Bengal, prepared its students for the Calcutta University degree in medicine, and Sircar was its first president. He also held office for a time as vice-chancellor of the university and was awarded a knighthood for his educational activities. He also served on the Bengal Legislative Council. He was instrumental in encouraging commercial undertakings by Bengalis, who for decades had played a minor part in the commerce of Bengal as compared with the Marwari community from the Central India Rajputana States. He thus became the founder and proprietor of soap and tannery companies. While visiting Great Britain in connexion with the British Empire Universities Bureau, he was honoured by the universities of Oxford and Edinburgh. He was a man of genial disposition and calm temperament, who inspired confidence and friendship among the leading Indians of his time, by whom he will be much missed.

LESLIE JOHNSTON PATON

MB CAMB, F R C S

THE death in London, on May 15, of Mr. Leslie Paton is a loss to two specialties. Consulting ophthalmic surgeon to St. Mary's Hospital and to the National Hospital, Queen Square, his special interest lay in the neurological aspects of ophthalmology to which he had made important contributions.

Payer

He was born in Edinburgh in 1872, the second son of the late James Paton, and was educated in Glasgow and at Cambridge where he was a scholar of Gonville and Caius College, and also held a Shuttleworth scholarship. Here he devoted much of his attention to botany, and for a time he worked in Professor Sachs's laboratory at Bonn. After graduating in 1900 he began eye work as clinical assistant to Marcus Gunn whom he also helped at Queen Square, and it may well have been this association that decided his life's work. He was appointed assistant ophthalmic surgeon to St. Mary's in 1902, having as his senior the late H. E. Juler, and in 1907 he joined the staff of the National Hospital.

Paton's clinico-pathological work, with Dr. Gordon Holmes, on papillœdema and intracranial tumours was published in *Brain* in 1911 and did much to clarify the pathology of papillitis and papillœdema—a distinction on which he laid great stress. His discovery of the Foster-Kennedy syndrome is not so well known in this country, but his priority has been generously described in a recent number of the *American Archives of Ophthalmology*. A notorious diplobacillus might also have been his, for he was working on angular conjunctivitis and had already discovered the causative organism when it was described by Morax and Axenfeld, but he delayed publication until he was sure of his results. This Scottish caution, though it restricted his own publications, was of great value to the *British Journal of Ophthalmology* of which he was chairman. His presidential address to the section of neurology of the Royal Society of Medicine—his election was an outstanding honour for an ophthalmologist—was devoted to the classification of optic atrophies, and in his Mackenzie lecture at Glasgow in 1937 he dealt with optic neuritis. Paton was a member of many foreign ophthalmological societies, and with Mr. Treacher Collins and Sir John Parsons he helped to resuscitate the international congress of ophthalmology after the last war. Its successful meetings at Amsterdam, Madrid and Cairo owed much to his work as one of the secretaries, and but for the deafness of his later years he would have presided over one of them. He was president of the Ophthalmological Society of the United Kingdom in 1929–30.

In the words of Sir John Parsons, Paton was a thoroughly competent and successful ophthalmic surgeon; and his grasp of the whole subject, aided by a soupçon of dogmatism, made him an excellent teacher at St. Mary's Hospital. It is regrettable that he did not hold a post on a special eye hospital, where postgraduates might have benefited by his enthusiasm and original ideas. His scientific training endowed him with breadth of view and meticulous accuracy of observation. His ardent expressions of opinion sometimes masked a very genuine modesty. "Apart from his work," writes Mr. Williamson-Noble, "he had wide interests. He was a skilled botanist, had a profound knowledge of literature, and being possessed of an excellent memory could always produce an apt quotation. In newspaper and magazine tests of general knowledge it was hopeless to attempt to compete with him. He believed in holidays, and all the time I knew him he made a point of taking six weeks right away from his work in the summer. He was kindness itself, and yet was not one who would tolerate fools gladly. One could not imagine anything he took on failing to be a success. He gave his whole mind to the matter in hand and this mind was well stocked and of no mean calibre."

Mr. Paton married in 1906 Miss May Kirkwood who survives him with two daughters.

It is with much regret that we have to record the death of P/O H. G. THOMPSON in a flying accident while on active service. Mr. Thompson joined the advertisement staff of THE LANCET in 1936 and during the several years he had been with us had earned the respect and affection of all with whom he came into contact. We have lost a loyal member of the staff, who will be greatly missed. He leaves a wife and baby daughter.

Notes and News

Research in Industrial Medicine

The Medical Research Council have arranged with the London Hospital for the establishment there of a department for research in industrial medicine. Dr. Donald Hunter, physician to the hospital, has accepted a part-time appointment to the Council's staff as physician-in-charge of the department, and the Council will appoint research assistants to work under his direction. The hospital is providing accommodation and facilities, and will be responsible for the treatment of cases under investigation. The primary purpose of the department is to undertake clinical researches into disorders affecting industrial workers, including both occupational diseases and others of a more general kind. This work will be done mainly in the department itself, but the staff will make visits from time to time to other parts of the country where special problems for investigation may be brought to the notice of the Council. The department will also be responsible for teaching and instruction in the subject. This arrangement supersedes that made last year for the appointment of a whole-time director of research in industrial medicine attached to the Council's headquarters. This post had become vacant through the appointment of Prof. A. W. M. Ellis to the regius chair of medicine at Oxford.

Civil Defence Conference

The new civil defence organisation, the Citizens Guild for Civil Defence, is holding a conference for those connected with the casualty services on June 10 at Victory House, Leicester Square, London, W.C.2, from 9.30 AM until 5.30 PM. The subjects for discussion include blitz first-aid rescue parties, ambulance work in training of fixed and mobile first-aid posts, and the disposal of the dead. Among those taking part in the conference are: Colonel H. R. Bateman, deputy director-general of casualty services in the Ministry of Home Security; Dr. Allen Daley, Dr. C. F. White, and Dr. C. A. Francis. Tickets may be obtained from the secretary of the guild, 20, Buckingham Street, London W.C.2.

Saving a Journey

Under the Workmen's Compensation Act, 1925, a certificate of disablement for a scheduled disease can only be obtained from the examining surgeon for the district in which a workman is employed. But nowadays many workmen are directed into work long distances from their homes. To meet this difficulty the Home Secretary has issued a direction under section 7 of the 1943 act, empowering the examining surgeon for the district where the workman lives or to which he has been removed for medical treatment to take over the duties of the examining surgeon for the district in which the workman is employed.

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University of Sheffield

Mr. J. T. Chesterman has been appointed lecturer in surgical pathology and assistant curator of the museum.

Royal College of Surgeons of Edinburgh

At a meeting of the college on May 18, with Mr. J. W. Struthers, the president in the chair, the following were admitted to the fellowship:

R. C. Baird, MRCS, D. B. E. Foster, MB WALES, R. C. J. Hill, LRCPE, R. C. Howard, MB CAMB., R. V. Liddell, MB EDIN; A. R. Murray, MB MELB., G. N. MacFarlane, MB DUBL., C. B. O'Carroll, MB LOND., T. E. Rutter, MB EDIN., R. A. Smith, MB LPOOL, and D. C. Wiseman, MB GLASG.

Medical Society of London

On Monday, May 31, at 11, Chandos Street, Cavendish Square, W.1, at 5.30 PM, Mr. Lionel Colledge will deliver the first Lettsomian lecture on the pathology and surgery of cancer of the pharynx and larynx.

Royal Society

Dr. Bernard Houssay, professor of physiology in the University of Buenos Aires, has been elected a foreign member.

Biochemical Society

A meeting of this society will be held in the department of medical chemistry of the University of Edinburgh, on Saturday, June 5, at 2.30 PM.

Protection of Typhus Teams

Experiments carried out by Mr. J. R. Busvine, PhD, have shown that the value of the protective garment designed for typhus teams (see *Lancet*, 1941, ii, 688) is greatly increased if immediately before use the material round the openings is sprayed with 2–4 c.cm. of undiluted lethane 384. As lethane is irritant and toxic, care should be taken to prevent it coming into direct contact with the skin.

Catholic Doctors and Assumption B

On June 5, at 3 PM, the Sword of the Spirit movement is holding a discussion at the Essex Hall, Essex Street, London, W.C.2, on Catholics and the future of medical services (assumption B of the Beveridge report). The opening speakers are to be Dr. Charles Hill, Dr. E. E. Larkin and Dr. Letitia Fairfield. Tickets may be had in advance from Sword of the Spirit, 68, Gloucester Place, W.1, or at the meeting.

Royal Society of Medicine

A meeting of the fellows of this society will be held on Tuesday, June 1, at 5 PM. At the section of history of medicine at 2.30 PM on June 3, Prof. Charles Singer will speak on Andreas Vesalius on the occasion of the fourth centenary of the publication of *De Humani Corporis Fabrica*, and Dr. E. Ashworth Underwood will describe two unpublished holographs of Sir Isaac Newton. Dr. A. E. Clark-Kennedy will read a paper on Stephen Hales, parson, physiologist and botanist. The sections of laryngology and otology will hold their combined summer meeting on June 4 and 5. On the first day at 5 PM Mr. H. G. Bedford Russell will discuss the displacement method, and Mr. W. Stirk Adams the diagnosis of sinusitis by radiopaque substances. At 10.30 AM on the second day Mr. A. W. G. Ewing, DSc, and Mrs. Irene Ewing will speak on the degree of incapacity due to deafness and on rehabilitation of the deaf, and Mr. Philip Franklin will read a paper on injuries to the hearing mechanism due to gunfire and blast.

The National State of Nutrition

For some time past hæmoglobin examinations have been carried out in selected areas of Great Britain as part of the investigations arranged by the Ministry of Health as a check on the effect of war-time feeding. The Ministry has now asked the Medical Research Council to make a hæmoglobin survey on a much bigger scale, covering cross-sections of the whole population. The first step in the new survey was taken recently, when the blood hæmoglobin of more than 400 members of the headquarters staff of the Ministry of Health was ascertained. Regular tests will be made in various parts of the country, and it is hoped that the volunteers will allow themselves to be re-examined in a few months' time. The object is to get information which, taken in conjunction with other nutritional surveys, should give warning of any deterioration among particular sections of the population or in particular areas.

WESTMINSTER HOSPITAL is to benefit by the proceeds of a performance by Mr. Donald Wolfit and his company of Molière's comedy *Le Malade Imaginaire* in English, to be given at the Westminster Theatre on Monday evening, May 31. Tickets may be obtained only at Westminster Hospital, St. John's Gardens, S.W.1.

Charles L. Mayer Award

The National Science Fund has awarded the first Charles L. Mayer prize of $2000 to Dr. Charles B. Huggins, professor of surgery at the University of Chicago, for his studies of the human prostate, with special relation to the cancers taking origin from this gland (see *Lancet*, Feb. 6, 1943, p. 177). A second award will be made for "Contributions made during 1943 to present-day knowledge of factors affecting the growth of animal cells with particular reference to human cancer." Applications should reach the office of the fund, 515, Madison Avenue, New York City, by Jan. 15, 1944. The advisory committee of the fund is interested primarily in fundamental studies on the factors influencing growth of animal cells rather than applications to any particular aspect of normal or abnormal growth.

Public Health Staffs

Local authorities in England and Wales are now required (circular 2818) to make a return of their public-health and school medical staffs to the Ministry of Health, to notify the Minister of vacancies and to seek his approval in filling them. Practitioners engaged in whole-time public-health and school medical work who are of military age, are reserved in the posts which they now hold and before applying for other posts they must obtain permission from the Minister through their (principal) regional medical officer. Permission will also be necessary in the case of married women who, if they were not married, would be liable to military service.

Liverpool Medical Institution

A meeting of the institution will be held on Thursday, June 3, at 4.30 PM, when Dr. Robert Coope and Mr. Morriston Davies will speak on the early recognition and diagnosis of, and possibilities of intervention in, diseases of the lungs, with special reference to bronchiectasis and carcinoma. Afterwards Mr. Hugh Reid will show a colour film illustrating lobectomy.

Medical Films at Bristol

Two new Ministry of Health films are to be shown at the Odeon Cinema, Bristol, on Sunday, June 6, at 10.45 AM. One deals with the diagnosis and treatment of scabies, the other with neuropsychiatry. Admission is restricted to doctors and medical personnel and invitation programmes can be obtained free of charge from the medical officer of health, Kenwith Lodge, Bristol, 6.

Appointments

AHERN, R. T., MB NUI: temp. deputy medical superintendent (class IV), at Heatherwood Hospital, LCC.

FRASER, R. J. L., MD GLASG., DOMS: ophthalmic medical referee for the county court districts of Appleby, Carlisle, Haltwhistle, and Alston, Penrith, Wigton, Barrow-in-Furness and Ulverston, Kendal, Kirkby Lonsdale, Windermere, Whitehaven and Millom, Workington and Cockermouth (circuit No. 3).

MORGAN, WINIFRED G., LRCPE: temp. deputy medical (class IV), Grove Park, Hospital, LCC.

Births, Marriages and Deaths

BIRTHS

BRIGGS.—On May 22, at Nottingham, the wife of Dr. Geoffrey Briggs—a daughter.

CHILD.—On May 16, at Preston, the wife of Major J. P. Child, RAMC—a son.

COWAN.—On April 12, at Worcester, the wife of Captain W. S. Cowan, RAMC—a son.

COLDREY.—On May 20, at Perth, the wife of Surgeon Lieutenant R. P. Coldrey, RNVR—a daughter.

PALEY.—On May 19, at Wimbledon, the wife of Captain R. G. Paley, RAMC—a son.

SWAIN.—On May 21, at St. Albans, the wife of Major R. H. A. Swain, RAMC—a son.

TUCKETT.—On May 16, at Tonbridge, the wife of Major C. I. Tuckett, RAMC—a son.

MARRIAGES

MOREL—ELMSLIE.—On May 17, in London, Mervyn Philip Morel, FRCS, squadron-leader RAFVR, to Daphne Anne Elmslie, asst. section officer WAAF.

RICHARDSON—WEBSTER.—On May 10, at Loughborough, John Eric Richardson, FRCS, surgeon lieutenant RNVR, to Elisabeth Webster.

DEATHS

ARTHUR.—On May 15, at Uxbridge, David Arthur, MD GLASG., DPH, formerly of Ealing, aged 86.

EVERETT.—On May 22, at Blandford, Dorset, Ernest William Everett, MRCS, aged 77.

FOOTNER.—On May 16, at St. Ives, Cornwall, George Rammell Footner, MB CAMB., FRCS, aged 63.

PRATT.—On May 23, at Wivelscombe, Somerset, John Wyatt Pratt, LRCPE, aged 97.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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DRUG CONTROL OF MALARIA

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THE development of the war in malarious areas has sharply revived interest in control of the disease by drugs. Despite their satisfactory action in acute malaria, quinine and mepacrine, the two substances most commonly used, leave much to be desired in the complete sterilisation of infection and consequently in the prevention of relapses. Even more unsatisfactory, especially in war, is the degree of their failure in prophylaxis, for they do not prevent the establishment of parasites and quite commonly fail to suppress the development of clinical manifestations of the infection. These shortcomings are responsible for recurring polemics on the value and proper use of the drugs, and probably for the renewed suggestions that better results could be obtained with doses larger than those normally employed. When one reflects how long the drugs have been known, it is both remarkable and regrettable that doubt still exists as to their best use. The problem is one of great difficulty, but the presence of large numbers of troops, indigenous and non-indigenous, in highly malarious areas demands serious and speedy efforts to solve it.

SUPPLIES OF DRUGS

A disturbing factor earlier in the war was the possibility of a serious shortage of antimalarial drugs. With the loss of Java the United Nations became deprived of 90% of the world's normal sources of quinine, so that their needs, enormously increased by the war, have now to be met by stocks in hand or by substitutes. Among counter measures already taken are the "freezing" of stocks and the restriction of quinine to essential purposes, which means that practically the whole supply is reserved for the treatment of malaria. Further, the American Board of Economic Warfare, according to a recent report (*J. Amer. med. Ass.* 1942, **120**, 1043), is fostering the importation of cinchona bark from South America. This bark is relatively poor in quinine but its total cinchona alkaloids, standardised and in proper dosage, should prove as effective as quinine in the treatment of malaria by mouth, for quinine seems to have been selected as the alkaloid of choice somewhat arbitrarily in the past. In fact, McGilchrist (1915) showed that cinchonine and quinidine are about as effective as quinine, and that cinchonidine also has some action against malaria. Total alkaloids have already been used in India and elsewhere successfully and relatively cheaply, and the Malaria Commission of the League of Nations, in its 4th General Report (1937), also suggested the use of total alkaloids for economic mass treatment. It is doubtful, however, whether even total alkaloids will suffice to meet the present great demands, and consequently the production of an alternative antimalarial agent in sufficient quantity is essential.

The only synthetic antimalarial compound of any real value so far in general use is mepacrine. There appear to be certain difficulties about its preparation, but the American War Production Board is now reported (*loc. cit.*) to have stimulated manufacture so that a sufficient supply to meet all anticipated needs is practically assured. Nevertheless, it is clear that wastage of antimalarial agents is to be avoided.

TREATMENT OF CLINICAL ATTACKS

During and shortly after the last war, extensive studies were carried out in England by Stephens and others (1917, 1919, 1923), mostly on patients infected in the tropics and therefore suffering from relapses, while further studies, mainly on benign tertian infections induced for the treatment of general paresis, have been well summarised in the 3rd General Report of the Malaria Commission of the League of Nations (1933). Both series showed that the most intensive treatment—e.g., 120 grains of quinine daily for 2 days or 45 grains daily for 8 weeks in benign tertian infections—was not strikingly superior to moderate dosage either in acute attacks or in preventing relapses. In vivax infections relapses tend to occur about the second and eighth month after the primary attack, and in falciparum infections mostly within two months of the primary attack; the League Commission concluded that no practical form of treatment can be guaranteed to prevent such relapses. A 5-day course of mepacrine about the eighth month in the fever-free interval of a vivax infection may postpone the relapse but may not prevent it.

There is good reason for believing that the final eradication of infection is brought about by an immunological process. Experimentally Boyd (1941) showed that premature termination of primary attacks by means of drugs results in more recurrences than when the attacks were untreated, and this influence of treatment on the development of immunity may also be observed in natural infections. Komp and Clark (1941) followed the course of endemic malaria in Panama, where in some villages each case had intensive treatment under medical supervision, while in control villages the antimalarial drug was distributed to patients who only used it as they desired. The intensively treated villages fared worse during epidemics than did the controls and the observers concluded that intensive treatment obstructed the development of immunity and in the given conditions was harmful to the population as a whole. Other field experiments have often shown exceptionally steep rises in the malaria incidence among treated populations, when suppressive treatment has been withdrawn (McNabb and Stewart 1927, Field, Niven and Hodgkin 1937, Mezincesco and Cornelson 1938, Parrot et al. 1937), and it is probable that drugs used suppressively, or prematurely in an acute attack, deprive the body of antigen from which immunity is derived.

Having in mind poverty-stricken populations of malarious zones, for whom cost of drug and state of immunity are important factors in deciding the optimal treatment, the League Commission (1937) suggested 15 grains of quinine daily for 7 days in acute attacks with larger doses in severe cases.

For non-immune Europeans operating for limited periods in malarious areas—for example, troops—cost of treatment and development of long term immunity are secondary considerations. For the immediate control of acute attacks in such persons 10 grains of quinine or 0·1 g. mepacrine thrice daily for 5 or 6 days seems in most cases adequate; the addition of pamaquin—e.g., 0·01 g. twice or thrice daily for 5 days—is held to lessen the tendency to relapse in vivax infections, but whether it does in falciparum infections is less clear. A well-recommended anti-relapse treatment is 10 grains of quinine or 0·1 g. mepacrine twice or thrice daily on two consecutive days of each week for two months after the treatment of the primary attack, while another is the normal suppressive dose of drug daily for a like period, but no method is entirely successful. A recent recommendation for patients not resuming continuous suppressive treatment is 0·1 g. mepacrine thrice daily for 5 days, beginning 10 days after treatment of the acute attack has ended. In the acute attack some prefer to combine all three drugs, giving for example quinine for the first two or three days, then a five-day course of mepacrine, and finally, after an interval of a couple of days, a course of pamaquin.

Among those who appear to favour large doses are Murray and Shute (1942), who treated a case of falciparum malaria, showing very few parasites, with an initial dose of 0·6 g. mepacrine followed 48 hours later by 0·3 g. daily for 5 days; they claim that this produced a dramatic cure unlikely to have been attained with oral quinine. If 0·6 g. mepacrine be taken as equivalent to 60 grains of quinine it is unlikely that anyone will test their contention, but it is conceivable in fact that 5 grains, and probable that 10 grains, of quinine thrice daily for a few days would have produced the same therapeutic end-result without any risk of toxicity. Hill (1942) has recently advocated intensive treatment of the acute attacks. He gave 30 grains of quinine and 0·4 g. mepacrine daily for 7 days, then 10 grains of quinine and 0·01 g. pamaquin daily for 5 days, after which the patients went on to a suppressive treatment of 15 grains of quinine daily and sometimes 0·1 g. mepacrine. Any permanent results of his initial intensive treatment are obscured by the subsequent large suppressive doses which in themselves were equivalent to continuous treatment of the acute attack. Incidentally, a combination of mepacrine and quinine was thought by Ciuca and his

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colleagues (1938) to be inferior to mepacrine alone in preventing relapses. Bryant (1942) also recommends large doses of mepacrine—namely, 0·6-0·9 g. daily—stating that he found 0·3 g. unsatisfactory in his cases of malignant tertian infections with severe vomiting. He quotes a report of Gentzkow and Callander (1938) on daily single doses of 0·6 g. mepacrine for 4 days, followed by pamaquin and sometimes quinine, but omits to add that because of its side effects the dose of mepacrine was later reduced in some stations from 0·6 to 0·4 g. Incidentally these American observers were not impressed by the value of mepacrine in preventing recurrences.

Apart from whether larger doses are more effective against the malarial attack itself than those normally used, other factors require consideration in arriving at the optimal dosage. If the dose produces unpleasant effects there will be a tendency to evasion of treatment, particularly of suppressive treatment, while if the dose produces toxic effects it may thereby defeat its own ends. Quinine is relatively non-toxic, but large doses quite commonly give rise to unpleasant effects; mepacrine is perhaps less unpleasant but the possibility of toxic effects from high or prolonged dosage may be greater. It must, of course, be realised that, for urgent short-term demands, war may justify greater risks of toxicity than would be acceptable in peace-time, but these risks should not be taken unnecessarily or without careful consideration of all the circumstances. As there is little to suggest that intensive treatment of primary attacks materially diminishes the frequency of relapses, and as excessive doses of mepacrine for prolonged periods may not be without danger of toxic effects, treatment such as the following case illustrates seems unnecessarily heavy and prolonged:

CASE 1.—Served in West Africa, where he took 5 grains of quinine daily but suffered several attacks of malaria. After an attack in August, 1942, he was given 0·4 g. mepacrine weekly, in addition to his daily quinine, but he had a further attack of malaria early in October followed by blackwater fever. On Oct. 20 he was ordered 0·1 g. mepacrine three times a day for two weeks followed by 0·1 g. twice a day for a week, and then 0·1 g. daily for six days in each week. In February he was invalided to the UK still taking the mepacrine, and with instructions to continue to take the 0·6 g. weekly for a further two months. When seen on his arrival home early in March he was intensely stained and his liver was enlarged and tender.

It is sometimes argued as justification for intensive treatment in a particular area that the parasites and the fever do not readily respond to lower dosage. Severe alimentary depression or continual vomiting, which are frequently features of certain malignant tertian infections, may interfere with the absorption of adequate amounts of drug given by mouth, and unless the medical and nursing staff remain constantly alive to this, the therapeutic response may be slow and the patient may even die. Where there is persistent vomiting an initial parenteral injection of drug is as essential as it is in cerebral or other grave cases.

An explanation sometimes invoked for failure of treatment is the existence of drug-fast strains of parasites. During the last war hundreds of cases of so-called quinine-resistant malaria were invalided home from the Middle East. Fletcher (1923) found that, although according to the medical histories of these patients enormous doses of quinine had been *prescribed* for long periods without effect, nevertheless when moderate doses of 20 grains of quinine sulphate were actually *administered* in his presence, the alleged resistance no longer existed. One of us has also during the last two years investigated several cases of alleged quinine resistance without finding evidence in any to substantiate the claim. Inadequate supervision with evasion of treatment, careless administration, improper preparation or adulteration of drug, failure of absorption because of vomiting or other cause, are only some of the factors which may require attention.

SUPPRESSIVE TREATMENT

The immunity of adult natives in hyperendemic zones of malaria is achieved at the cost of frequent fevers in infancy and childhood, and it is obvious that naturally acquired immunity can play little part in the protection of Europeans, particularly troops operating for limited periods during which it is essential that they be maintained as physically fit as possible.

However promising chemotherapeutic developments may be, there is no drug yet in common practical use which will prevent with certainty the establishment of a malarial infection, although this does not necessarily mean that the judicious use of those now available is valueless in suppressing or modifying the development of the clinical manifestation of such an infection. In arriving at the optimal suppressive regime there are many factors to be considered, and it cannot simply be assumed that efficiency will vary directly as the dose of drug. In dealing with indigenous populations the possible effects of disturbing naturally acquired immunity must be taken into account, while for non-indigenous individuals, as already indicated, the possibility of producing unpleasant effects leading to evasion of treatment, or the danger of giving rise to toxic reactions, are important when stepping up the dosage. Much thought, strict supervision, and careful controls are required therefore in designing and assessing any particular form of suppressive treatment.

In the last war the Sergents (1932) enforced the consumption of 0·4 g. quinine daily with disciplinary measures in the French Army in Macedonia. In 1916 the Tanret reaction showed that only 15% of the troops were taking quinine, but in 1918 the reaction was positive in nearly 100%. In 1916, with four divisions in the field, the malarial peak was reached in September with 8000 primary cases, but in 1917 with eight divisions the peak was only about 1000; in 1916 there were 379 deaths from malaria, in 1917 there were 71 and in 1918 only 54. The following figures from the *Official History of the War* (1931) show that for the British and Dominion troops in Macedonia there was no such fall in the incidence of malaria.

	1916	*1917*	*1918*
Malaria admissions ..	32,018	71,412	59,087
Rate per 1000	259·48	391·12	458·94
Deaths from malaria ..	287	228	272
Rate per 1000	2·33	1·25	2·11

The Germans also, according to the Sergents, continued to suffer as badly in 1917 as they did in 1916 from malaria. In contrast to the French workers, 97 out of 129 British medical officers reported unfavourably on the value of prophylactic quinine, but it is particularly from this theatre of the war that so many cases of so-called quinine-resistant malaria were invalided to Great Britain, and it is possible that a sufficiently strict supervision of the actual consumption of drug was not exercised.

There are now several satisfactory reports of the use of mepacrine in suppressive treatment. Bonne and Stoker (1935) gave 0·1 g. daily to 75 adult Asiatic prisoners for 3 months apparently with good results and without unpleasant effects other than staining, and Junge (1933, 1939), using the same dose in a few Europeans for periods ranging up to 2 years, reported similarly, but he in the end recommended 0·05 g. daily. Winchester (1936) in a small experiment thought 0·05 g. daily successful, as did Mezincesco and Cornelson (1938) dealing with larger populations. Niven (1938), Field (1939) and their collaborators, reporting on extensive well-controlled trials on estate populations in Malaya, found 0·3 g. mepacrine weekly to be the minimum effective dose, and on grounds of efficacy, safety, and convenience of administration, they advocated a single dose of 0·3 g. mepacrine weekly. In the 4th General Report of the Malaria Commission of the League of Nations (1937), the opinion is given that 0·05 g. mepacrine daily is slightly inferior, and 0·2 g. bi-weekly slightly superior to 5 grains of quinine daily. Pointing out that it is more difficult in military practice to control the use of a drug given bi-weekly than of one taken daily, Rose (1941) gave 0·06 g. mepacrine daily to German troops in the Balkan campaign of the present war, but does not appear to have come to any unequivocal conclusion on its value; there were complaints from the soldiers and from the doctors that the mepacrine had a cathartic effect, but Rose himself believes that the drug had nothing to do with the diarrhœa. Hill (1942) seems very favourably impressed with 0·1 g. mepacrine daily for suppressive treatment and apparently observed no toxic effects from this

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dosage over a period of some months. A recent recommendation for those in hyperendemic areas is 0·1 g. mepacrine for 6 days of each week, beginning a week before entering and continuing for a week after leaving the malarious area.

In view of the shortage of quinine it is fortunate that mepacrine can replace quinine in suppressive treatment, since it is this phase of treatment that accounts for the greater part of the total consumption of antimalarial drugs. What will prove to be the optimum dosage and spacing, and what possible toxic effects may be justifiably risked for specific purposes are important questions, about which there is still much discussion. Any methods at present employed should therefore be subjected to control and careful analysis. Apart from the need for comparative series of cases with statistically accurate analyses, precision in diagnosis is obviously an important factor in the correct assessment of various forms of control, and the diagnosis of malaria may present many puzzling features, particularly when the patients are taking suppressive treatment in a hyperendemic area.

PROBLEMS IN DIAGNOSIS

It is usually impossible in a hyperendemic zone to distinguish relapse from reinfection and unless this is borne in mind confusion and error may arise in evaluating treatment. Even when the species of parasite found in the second attack appears different from that present in the primary attack, it is not always justifiable to suppose that the second attack represents a new infection, for it is demonstrable experimentally that simultaneous infection with two species may influence the relative development of each. Thus when *Plasmodium vivax* and *P. falciparum* are simultaneously inoculated the *P. vivax* becomes ultimately the dominant species although the *P. falciparum* is more prominent initially.

It is obvious that in all cases of fever in the hyperendemic area malaria must be excluded as the cause, and it is a matter of more than academic importance to establish the diagnosis whenever possible by the identification of parasites in the blood. It is true that parasites in the adult native may have little practical significance and indeed may be a source of diagnostic confusion, but in the non-immune European it is well to accept their presence as significant. The absence of parasites in suspected cases of malaria may cause difficulty when routine suppressive treatment is being taken, and particularly when, as often happens, the patient, in an endeavour to treat himself without seeking medical advice, has increased his usual dose on feeling unwell. In such cases it may not be easy to estimate the effect of the drug on the blood findings, but generally speaking parasites can be found in all severe cases of malaria, whether drug has been taken or not, and the more severe the attack the more likely is a positive finding, whatever the antecedent dose of drug may have been; Field (1939) found even with full doses of quinine or mepacrine that it took 2–7 days for parasites completely to disappear from the peripheral blood. It should be noted, however, that the advent of fever may sometimes precede the presence of parasites in detectable numbers in the peripheral blood by 24 hours or more, and this lag is particularly found in primary infections.

In less acute cases parasites may be less easily detected, but they can still be found in many patients who take prophylactic drug regularly, although it must be remembered that the patient's statements that prophylaxis has been regularly carried out cannot always be relied on, especially when evasion of suppressive treatment may involve some penalty. Junge (1933) found parasites in the blood of 2 of 6 experimental subjects taking 0·1 g. mepacrine daily, and, in the following cases seen recently by one of us the history seemed very reliable.

CASE 2.—Seen on arrival in the UK, 18 days after his return from 12 months service in Nigeria, where he had four attacks of malaria, each being treated with quinine and mepacrine. He took 5 grains and sometimes 10 grains quinine daily as suppressive treatment while in Africa, and since arriving in the UK had taken 0·2 g. mepacrine bi-weekly, the last dose being only 2 days before he was seen, at which time he was slightly icteric, his temperature was 104·8° F., there was splenomegaly and the blood contained *P. falciparum*.

CASE 3.—Returned to the UK in June, 1942, after 2 years service in Africa, where he had two attacks of malaria and an attack of blackwater fever. Before the blackwater fever, which occurred in March, 1942, he took 5 grains quinine daily, and subsequently 0·3 g. mepacrine weekly. After arrival in the UK he continued to take the mepacrine for 2 months, his last dose being the week before he was examined, when he was still stained yellow, his spleen was just palpable, his hæmoglobin 70% (Haldane), his erythrocyte count 3,760,000 per c.mm. and his blood contained *P. falciparum*.

A patient should, of course, never be left in any danger because of a delay in obtaining the result of the blood examination. In all severe cases, or in those whose signs strongly suggest malaria, the correct procedure, where the blood cannot be examined immediately, is to give quinine or mepacrine and at the same time take blood films for subsequent examination; when the results of the blood examination become available, the treatment may if necessary be modified. If there is much vomiting, or signs of cerebral or other grave involvement, this initial dose of drug should be given by parenteral injection.

If the illness is severe and no parasites are found by a competent observer, the possibility of some other acute infection should be entertained. We have seen such conditions as amœbic hepatitis, pyelitis, pneumonia, typhoid, meningococcal septicæmia, typhus, leptospirosis and acute lymphocytic choriomeningitis mistaken for malaria, and such cases sometimes account for the reported failures of antimalarial drugs. In one recent epidemic of infective hepatitis every case had been diagnosed as malaria, and 4 out of 6 who vomited had received injections of quinine or mepacrine. It is worth noting that meningitis of meningococcal or pneumococcal origin may be mistaken for cerebral malaria unless adequate laboratory methods are employed in the diagnosis.

On the other hand, true cases of malaria may, in the absence of adequate examination, be mistaken for other diseases, a mistake that has cost more than one patient his life. It must be emphasised that clinically malaria often fails to conform to any classical picture of intermittent fever, and this is commonly so with the malignant tertian infections, which are the most dangerous. Atypical fever is perhaps less common with the other varieties of malaria, but may occur, particularly in primary attacks; Sydenham noted that sometimes these "do not perfectly put on their shapes," and added "if this be not carefully observed, we shall be deceived in our prescriptions, much to the prejudice of our patients." Proper pathological as well as clinical examinations, together with a careful consideration of all the findings, are essential if errors are to be avoided.

The difficulty of distinguishing between new infections and relapses in hyperendemic zones has been mentioned, and may give rise to confusion about chronic malaria. Where falciparum infections are hyperendemic, it is not common to see the exaggerated cases conforming to certain classical pictures drawn from natives of endemic zones, usually children or young adults with slight fever, splenomegaly, anæmia and emaciation, but who in most instances are also subject to other diseases such as ankylostomiasis, schistosomiasis and malnutrition.

There is, however, a group of cases not uncommonly seen in hyperendemic zones, important because it is responsible for invalidings under such headings as "chronic malaria," "malarial cachexia," or even "tropical neurasthenia." The patients commonly complain of "low fever," of disinclination for food or work, and often of insomnia; they usually claim to take suppressive quinine and frequently take extra doses for a few days at a time. Parasites are difficult to find, but withdrawal of the suppressive drug for 5 or 6 days may be followed by an attack of fever with obvious parasites, when adequate treatment is rewarded by a spectacular disappearance of symptoms. It is often argued whether this result could not be obtained directly by an adequate course of quinine or mepacrine, and whether inducing an attack of fever is justified; an objection sometimes raised to the latter procedure is that it may increase the chance of blackwater fever, but this is speculation. Mühlens (1933), among others, held that in Europeans back from the tropics better ultimate results followed the treatment of a frank febrile attack than of a latent infection without obvious parasites in the blood; this could be explained by

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assuming a greater associated immunological reaction from the larger number of parasites in the former instance.

As falciparum relapses often occur within 2 months, Europeans are commonly recommended to continue suppressive treatment for this period after leaving hyperendemic zones; the absolute value of this recommendation is difficult to assess, and even in those later seen with an attack it is not always easy to be sure whether the treatment has failed or has been neglected. Another method sometimes advised as more convenient and efficacious than the longer procedure is a short so-called "sterilising" course of mepacrine (0·1 g. thrice daily for 5 days); one of us has recommended that this be started about the 10th day after leaving the infected area, so as to meet the development of the latest infection.

As indicated, both experimental and practical observations show that any procedure may fail, and consequently malaria should always be borne in mind as a possible cause of illness in a patient returned from a malarious area, whatever may have been his history or treatment.

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TUBERCULOSIS TREATED WITH PROMIN

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Sodium *p* : *p'*-diamino diphenyl sulphone-N : N'-didextrose sulphonate ('Promin') has been synthesised and tested in the research laboratories of Parke, Davis and Co. It has been used tentatively in the treatment of experimental and clinical tuberculosis in the USA and Canada. Treatment of the induced disease in guineapigs (Feldman et al. 1940, 1941, 1942) has shown rather impressive results. Promin has been given to patients orally and intravenously (Hinshaw and Feldman 1941) but the results so far have not been very encouraging. It has been given in large doses as an intravenous drip (Zucker et al. 1942) and to a few patients in the form of a nebulised spray (Barach et al. 1942). A recent article by Tytler and Lapp (1942) described its use as an external application to tuberculous sinuses.

During the past 6 months promin has been tried on the following cases at Colindale Hospital; 2 other laryngeal cases were treated at the Grove Hospital, Tooting.

Pulmonary tuberculosis	14
Pulmonary tuberculosis with tuberculous laryngitis	4*
Genito-urinary tuberculosis	1

* Direct application only.

This article is an interim report on work which is continuing.

METHODS AND DOSAGE

The drug was given continuously for two weeks; one week's rest followed before the next fortnightly period was started. In calculating the length of the course of treatment these rest weeks are included, as it was found that the blood-concentration of promin was well maintained during that period. The courses have varied in length from 2 to 15 weeks, the majority lasting more than 6 weeks and the average being 8½ weeks.

The drug was given orally in 13 cases, the dosage being 0·2 g. thrice daily for the first fortnight, 0·4 g. thrice daily in the subsequent periods, except in 3 cases, when the dose was again increased to 0·6 g.

In 2 cases the drug was given by an intravenous injection daily, the dose being 1·2 g. initially, and being later raised to 2·4 g. One of these cases was the genito-urinary case.

The total dosage given varied from 8·4 g. (2 weeks) to 96·8 g. (11 weeks), and exceeded 30 g. in 10 cases.

In the latter half of the series, all the pulmonary cases were given, as a routine, ferrous sulphate, gr. 3 three times a day for the duration of the course of promin.

A period of bed-rest varying from 6 weeks to 16 months (average 23 weeks) preceded the promin treatment in every pulmonary case, and was regarded as a control period. During this period 3 cases had shown a slight improvement, and the rest were stationary or worse. The genito-urinary case had had 2 weeks bed rest and was surgically untreatable. The clinical state was assessed by radiograms, hæmograms (Houghton index), temperature, weight and examination of sputum for tubercle bacilli. The promin concentration in the blood and urine was estimated weekly. The blood and urine were examined weekly for abnormal pigments, and the hæmoglobin was estimated weekly. The total red and white cells were counted in every case at the beginning and end of the course, and in 9 cases there were full weekly blood examinations.

LABORATORY INVESTIGATIONS

Tests were carried out by Mr. C. E. Glover and the North-Western Group Laboratory.

1. *Oral administration.*—The highest blood-concentration of promin reached was 4·4 mg. per 100 c.cm.; this was reached with a dosage of 0·4 g. three times a day; the majority averaged 2·5 mg. During the week's rest the concentration fell to about 1 mg. per 100 c.cm. The level of promin in the blood did not follow the dose given at all closely.

The hæmoglobin fell in all cases, until iron was given as a routine, and in several cases did so very rapidly. Thus one case fell in one week from 78% to 47%, and another from 74% to 58%. After we started giving iron as a routine, this fall in hæmoglobin was not seen or was only slight. The red-cell count followed the hæmoglobin. If the anæmia was severe, it was usual to find urobilin in the urine, and sulphæmoglobin in the blood, but these pigments sometimes appeared without severe anæmia, and sometimes there was a fall in the hæmoglobin without their appearance. The white-cell count was not affected except in one case in which it rose from 10,500 to 21,400 in one week. This patient died soon afterwards. The occurrence and severity of the anæmia did not appear to be related to the size of the dose of promin.

The promin concentration in the urine reached much higher figures than in the blood—sometimes more than 100 mg. per 100 c.cm.—and was well maintained, though at a lower figure, during the rest periods. But as the specimens were not always taken at the same time of day, they are not comparable and we do not intend to discuss them at length.

2. *Intravenous administration.*—There was no tendency to anæmia in our 2 cases, and no abnormal pigments were found in the blood or urine. One of these cases was given iron throughout the course, and the other has had none. The promin concentration was estimated weekly, in specimens of blood taken 24 hours after the last injection of promin. It averaged 1 mg. per 100 c.cm., varying

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between 0·4 and 2, and was maintained at about 0·7 mg. per 100 c.cm. during the rest periods of one week without promin. During these rest periods the promin concentration in the urine would fall rapidly, and might disappear from the urine while being well maintained in the blood.

3. *Promin by other routes.*—Full laboratory investigations were not made on the laryngeal cases, but it is of interest to note here 2 cases not included in this series; in these 10% promin ointment was applied to discharging sinuses after Monaldi drainage, and the blood-promin concentration reached 0·5 mg. per 100 c.cm. in one case and 0·3 mg. in the other after a week.

CLINICAL RESULTS

The 14 cases of pulmonary tuberculosis can be grouped as follows:

	Cases
Fibrocaseous disease, with cavitation	8
Pneumonic tuberculosis	1
Limited disease of exudative type	3
Thoracoplasty, with bronchogenic spread to opposite side	2

The 2 cases that received their promin intravenously did not complain of any untoward symptoms. The cases that received it orally developed symptoms such as have been described by previous workers. They became cyanosed and tended to get mild or severe headaches, nausea and occasional vomiting, and giddiness which was worse if the patients were allowed to get up for some hours. Transient diplopia arose in one case. It should be stated that no patient regarded his symptoms as very trying.

The cases have been assessed as described, and the results are summarised in the table.

CLINICAL RESULTS OF TREATMENT OF 14 CASES OF PULMONARY TUBERCULOSIS WITH PROMIN

Clinical state	Cases	Worse or dead	No change	Slightly improved	Definitely improved
Advanced, poor resistance	2	2	0	0	0
Advanced, good resistance	5	0	2	1	2
Moderate disease	4	0	2	0	2
Limited disease	3	0	2	0	1

The 6 cases included under the headings "slightly" or "definitely" improved showed radiological evidence of improvement. The Houghton index showed improvement in 3 of these, without any constant change in any one factor of the index. In the other 3 the Houghton index was unchanged. In one case the sputum changed from positive to negative for tubercle bacilli.

Of 9 cases of pulmonary tuberculosis who each received more than 30 g. of promin, 5 showed improvement; these had not improved during the previous control period.

Promin probably had a deleterious effect on one patient.

CASE 1.—A man aged 30, with advanced fibrocaseous disease and cavitation, swinging pyrexia, and an early tuberculosis of the larynx. During two weeks of promin administration his hæmoglobin dropped from 88% to 49%, and his general condition became much worse. Promin was stopped after he had only had 8·4 g. Three blood transfusions, totalling four pints, were given, but he died a fortnight later.

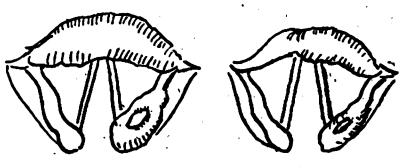
The autopsy (by Dr. A. B. Bratton) showed very advanced tuberculosis of the larynx, and an apparently recent generalised miliary spread throughout the body which had not been suspected before. Promin administration might have lowered this patient's resistance.

CASE 2.—The genito-urinary case (under Mr. F. J. Barrington, treated by Dr. D. P. Choyce) was a woman aged 33, with tuberculosis of both kidneys and of the bladder. She had been getting steadily worse for 9 months, was losing weight, had painful and frequent micturition (40 times daily and 40 at night). She was given promin intravenously for 2 months, receiving 82 g. in all. In that time her general condition has greatly improved; she has gained 16 lb. in weight, the frequency of micturition is about 15 times daily and 3 at night and micturition is not painful. She is still excreting tubercle bacilli in her urine. She is continuing to receive promin, and it is hoped to give promin to some similar cases.

LARYNGEAL APPLICATION

Of these cases, 2 were treated for two months by insufflation through a Ledue's tube of a powder consisting of promin, orthoform and starch in equal amounts. There was no laryngoscopic improvement and it has been suggested (Parke, Davis and Co.) that the starch might keep promin from reaching the lesion. It is worth giving fuller details of the other two patients.

CASE 3.—A man aged 42. Stage B3. Larynx on Dec. 31, 1942: infiltration and thickening of the posterior ends of both vocal cords and some œdema of left arytenoid. Larynx painted twice daily for 21 days with 50% promin in glycerin, applied by swab under direct vision. Larynx on Jan. 30, 1943: infiltration and thickening still present, but œdema of arytenoid much less. Congestion decreased. Patient was coöperative in resting his voice so credit cannot definitely be given to promin. The paint was not irritating.



(a) (b)

Case 4, laryngeal tuberculosis; (a) gross œdema of epiglottis and of left arytenoid, with large shallow ulcer on latter; (b) after treatment with promin, decreased œdema and much reduced size of ulcer.

CASE 4.—Aged 54. Stage B3. Larynx on Dec. 31, 1942: epiglottis œdematous, left arytenoid swollen, with large shallow; ulcer on upper surface; cords intensely congested. Larynx sprayed twice daily for 18 days with 20% aqueous solution of promin, and then painted with 50% promin in glycerin paint once daily for 8 days. Larynx on Jan. '30, 1943: whole appearance cleaner, œdema decreased and ulcer smaller; still much congestion (see figure). Neither spray nor paint was irritating. Patient made no attempt to keep silence, so improvement was due to promin.

DISCUSSION

We realise that these results are indefinite. The cases that improved radiologically showed definite recession of more recent areas of infiltration, but there was nothing approaching a cure. The nature of pulmonary tuberculosis makes it less vulnerable than infections which respond to sulphonamides to the action of a chemotherapeutic agent circulating in the blood. A nebulised spray (e.g. through a bronchoscope) might reach some open lesions, but we find it hard to believe that it would affect scattered parenchymatous foci which have not cavitated. Blood-stream administration must be long and the case chosen must show neither predominance of fibrosis nor advanced disease with toxæmia and poor resistance. Obviously, early cases would be experimentally admirable if it were not for their tendency to improve with conservative treatment alone. The difficulty in finding suitable patients has acted almost as greatly as the short supply of the drug in limiting the number of our cases. The latter problem has improved somewhat and it will be possible to give a longer course with slightly increased doses (though probably 4–5 mg. per 100 c.cm. is the highest blood-concentration which is safe for more than a short period).

We have been impressed by the absence of anæmia or other reaction in the 2 patients treated intravenously. This is contrary to the experience of American workers and must be confirmed. Moreover, dose for dose, oral administration for some reason seems to give higher blood concentrations, and is apparently safe if it be accompanied by iron.

As regards laryngeal application favourable results have been obtained in 2 cases by the direct application of promin in liquid solution or oily vehicle and it is worth continuing on this line of treatment. We propose also to give promin to more cases with tuberculosis of the genito-urinary tract.

So far as we can judge now, promin is not the desired medicament for the cure of tuberculosis (though it may be a pointer in the search for it) and should not be given indiscriminately or without laboratory control.

We feel justified in drawing the following conclusions:

1. Promin when given orally produces unpleasant (though not very trying) toxic symptoms and hæmolytic anæmia.

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2. The occurrence of this anæmia is prevented by giving iron.

3. No toxic symptoms or anæmia were produced in the 2 cases to whom we gave promin intravenously.

4. Promin should not be given by mouth for advanced cases of pulmonary tuberculosis with toxæmia and poor resistance.

5. The local application of promin in cases of laryngeal tuberculosis is worthy of further investigation.

Acknowledgments are due to Dr. W. Allen Daley, medical officer of health to the LCC, for permission to publish; to Dr. W. Snell, medical superintendent of Colindale Hospital; Dr. J. C. McEntee, medical superintendent of the Grove Hospital; and to Dr. Stanley White for his advice and assistance. Messrs. Parke, Davis and Co. kindly supplied the promin.

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MAPHARSIDE IN THE TREATMENT OF EARLY SYPHILIS

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Meta-amino-*para*-hydroxyphenyl arsenoxide * was first synthesised by Ehrlich, but was rejected by him on account of its supposed toxicity. In 1931 Tatum and Cooper (1932) reinvestigated its chemotherapy, and later Gruhzit (1935) by animal experiment, and Foerster (1935) in a series of cases, proved that the compound was decidedly less toxic than was supposed. Leifer, Chargin and Hyman (1941), having tried to cure syphilis by massive doses of neoarsphenamine and found that this arsenical was too toxic, turned to 'Mapharside' as an alternative. By continuous experiment over several years, it has clearly emerged that 1200 mg. of mapharside may be given with comparative safety, by either the continuous drip method or the daily multiple injection technique. Neoarsphenamine is extremely toxic when given by continuous drip in dosage of 4000 mg. over a period of five days, as is shown in the following list of toxic effects in 111 cases.

Toxicoderma	45%
Peripheral neuritis	35%
Jaundice	3·6%
Exfoliative dermatitis	0·9%
Cerebral symptoms	1·8%

Comparative figures (Elliott et al. 1941) in a group of 1600 cases who received 1150–1250 mg. of mapharside in five days, are as follows:

	Group 1 (502 cases)	*Group 2* (466 cases)
Toxicoderma	16·8	10·5
Peripheral neuritis	10·1	9·9
Liver damage	11·0	4·0
Exfoliative dermatitis	0	0
Serious cerebral symptoms—		
Fatal	0	0·7
Non-fatal	0·5	0·7

In this series only 2 cases of jaundice were seen; "liver damage" refers to those patients whose icteric index rose above 10.

As far as can be judged from the above figures it would appear that, weight for weight, mapharside is three times as toxic as neoarsphenamine. Stephenson (1939), reporting on arsenical reactions experienced in the US Navy during 1938, states that 42,755 injections of mapharside were followed in 7 instances by reactions (1 in 6108) with no fatal case, while 71,094 injections of neoarsphenamine were followed by reactions in 32 instances (1 in 2240), with 3 deaths. In 1940 (Stephenson 1941) the number of mapharside injections had increased to 81,411, as against 36,976 injections of neoarsphenamine. Reactions to mapharside were 1 to 5815 injections with no fatality, as against 1 to 1946 injections with one death in the case of neoarsphenamine. In their review of the toxic reactions, Levin and Keddie (1942) say that patients who have mild or moderate cutaneous reactions to the arsphenamines can, in about 85% of cases, tolerate mapharside, and that 90% of the patients who have severe gastro-intestinal reactions to the arsphenamines can tolerate mapharside in therapeutic doses.

* 'Mapharside' is Messrs. Parke, Davis and Co's proprietary name for this compound.

STUDY IN LIVERPOOL

Since most of the reports on the therapeutic efficiency of mapharside have been published by American workers, who use the continuous alternating system of treatment, it was thought worth while to substitute mapharside for neoarsphenamine in an established course, in an attempt to assess the value of this comparatively new arsenical. Hence the present study.

For the past eighteen years, the technique of twice-weekly injections of arsenic and bismuth has been used extensively in Liverpool. For five years, the weekly dosage was 1·05 g. of neoarsphenamine (NAB) together with 0·4 g. of bismuth oxychloride for four weeks. In order to conform to the widely held idea that about 6 g. of arsenic constituted a full course, two injections of 0·75 g. of neoarsphenamine were given at intervals of one week to complete the course, while bismuth dosage totalled 2·4 g. The course is outlined below.

Day	NAB (g.)	Bismuth (g.)	Day	NAB (g.)	Bismuth (g.)
1	0·45	0·2	25	0·6	0·2
4	0·6	0·2	29	Nil	0·2
8	0·45	0·2	32	0·75	0·2
11	0·6	0·2	36	Nil	0·2
15	0·45	0·2	39	0·75	0·2
18	0·6	0·2			
22	0·45	0·2	Total	5·7	2·4

It was found that after a rest period of three months, *all* primary, secondary and early latent cases of syphilis had negative blood Wassermanns, and furthermore, that serological relapse did not occur for at least six months after the completion of the course. Another discovery (Prebble 1933) was that the first twenty-five days of treatment produced the same desirable result (i.e., a total of 4·2 g. of NAB and 1·6 g. of bismuth). Therefore, trial was given to the course given below.

Day	NAB (g.)	Bismuth (g.)	Day	NAB (g.)	Bismuth (g.)
1	0·3	0·1–0·2	25	0·45	0·1–0·2
4	0·45	0·1–0·2	29	0·3	0·1–0·2
8	0·3	0·1–0·2	32	0·45	0·1–0·2
11	0·45	0·1–0·2	36	0·3	0·1–0·2
15	0·3	0·1–0·2	39	0·45	0·1–0·2
18	0·45	0·1–0·2			
22	0·3	0·1–0·2	Total	4·5	1·2–2·4

The same 100% serological-reversal of positive Wassermanns resulted, and toxic reactions were greatly reduced. Three such courses were given, and the rest interval between the second and third course was extended from three to six months. Blood Wassermann tests were performed at six-monthly intervals for three years, and in the fifth year after infection the cerebrospinal fluid was examined. The blood Wassermann remained negative in all cases throughout the three-year period, and the cerebrospinal fluid was reported normal to the usual tests. This course appeared to be a yardstick against which the potency of mapharside could be measured. It was confirmed that 0·06 g. of mapharside killed all *Spirochæta pallida* in primary lesions within 24 hours, and therefore this dose could be compared with 0·45 g. of NAB (Harrison 1935). The following course was then evolved.

Day	Mapharside (g.) Men	Mapharside (g.) Women	Bismuth (g.) Men	Bismuth (g.) Women
1	0·04	0·02	0·1	0·2
4	0·06	0·04	0·1	..
8	0·04	0·04	0·1	0·2
11	0·06	0·04	0·1	..
15	0·04	0·04	0·1	0·2
18	0·06	0·04	0·1	..
22	0·04	0·04	0·1	0·2
25	0·06	0·04	0·1	..
29	0·04	0·04	0·1	0·2
32	0·06	0·04	0·1	..
36	0·04	0·04	0·1	0·2
39	0·06	0·04	0·1	..
Total	0·6	0·46	1·2	1·2

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Twelve hundred cases of syphilis have been treated thus, and toxic reactions have been minimal. There was one death.

On Nov. 28, 1940, a Hindu seaman, aged 40, reported with a penile ulcer and massed lymphatic glands in the left inguinal and iliac region. No *S. pallida* was found in serum from the penile ulcer, but the blood Wassermann was strongly positive. Treatment for primary syphilis by mapharside and bismuth, and for lymphopathia venereum by oral administration of 3 g. of sulphanilamide daily, was instituted. The clinical signs of both diseases retrogressed normally, but on the evening of the sixteenth day of treatment, when 0·24 g. of mapharside, 0·5 g. of bismuth and 48 g. of sulphanilamide had been given, the patient became comatose and incontinent of urine and fæces. He was removed to hospital, where he died. Post-mortem examination showed the typical appearances of encephalitis hæmorrhagica.

Postarsenical encephalitis hæmorrhagica most often occurs in young adults, between the second and fourth arsenical injection, and in pregnant women. In the present case, the patient was a man of 40, and the condition followed the fifth injection of an arsenical. Owing to the comparative rarity of syphilis and lymphopathia venereum in one patient, the effects of combined treatment have not been defined. Fears have been expressed that a greater incidence of jaundice and agranulocytosis will follow the administration of arsenicals if sulphonamides are exhibited at the same time. Possibly the known action of the virus of lymphopathia venereum on brain and meninges may lead to a toxic encephalopathy, if arsenicals and sulphanilamide are given simultaneously.

The results in 150 cases of early syphilis observed for three months after one course of treatment were:

Type	Three months after one course of treatment	
	Cases WR −	Cases WR +
Sero-negative primary	47	0
Sero-positive primary	61	1
Secondary	41	0
Total	149	1

In the one positive case, through a fault in supervision, no confirmatory test was made, but three months after a second course the Wassermann became negative. Of the 150 cases, 11 were women who received only 0·46 g. of mapharside and 1·2 g. of bismuth, and all were negative three months after that course.

In 89 cases, a blood Wassermann test was done on the 39th day of treatment, with the following results.

Type	WR −	WR +
Sero-negative primary	39	0
Sero-positive primary	22	13
Secondary	11	4

It will be noted that a reversal of the blood Wassermann from positive to negative was achieved in 66% of cases, after 11 injections of this standard course had been given. Ten of the cases positive at the end of one course have reported after an interval of three months, and all have become negative. Twenty-six cases have been observed for over a year, and in none of them has clinical or serological relapse occurred. It appears therefore that weight for weight, mapharside is seven and a half times as potent as neoarsphenamine.

SUMMARY

In 150 cases of early syphilis mapharside has been substituted for neoarsphenamine in a standard course which assured serological reversal in 100% of cases three months after its completion.

Mapharside has succeeded, except in one case, in replacing neoarsphenamine, and since in efficient dosage it is considerably less toxic than neoarsphenamine its extended use seems rational.

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STRANGULATED FEMORAL HERNIA

REVIEW OF 100 CASES

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SURGEON LIEUT.-COMMANDER RANR

ANATOMICAL reasons doubtless explain the greater liability of femoral hernia to undergo strangulation as compared with inguinal hernia. In 1925, the Mount Sinai Hospital, New York, found that 32% of the cases with femoral hernia as compared with only 4% of the inguinal hernia cases were suffering from strangulation on entering hospital.

The admission of a large number of cases of strangulated femoral hernia into a London hospital within a short space of time stimulated me to search the hospital records for cases of a similar nature. Some 115 patients with strangulated femoral hernia were treated in one institution over 5 years, but the records of only 100 of these were found suitable for the purposes of this paper. The results of the investigation give a fairly accurate general survey of the subject, since they embody the work of a number of surgeons over a period of years. A depressing feature of these admissions was the variety of diagnoses which accompanied them to hospital—almost any condition capable of causing abdominal pain being suggested rather than the correct one. This arresting frequency of diagnostic error in connexion with so common an abdominal emergency and the fact that the average period of symptoms of strangulation preceding admission in this group of cases amounted to no less than two days, make one reiterate the old plea: "Remember the hernia rings" in the investigation of every urgent abdominal case.

Age and sex.—The average age of cases under review was 63·3 years, the oldest being 96 and the youngest 35; 66 of the patients were over the age of 60. There were 76 women, and of the 14 cases under the age of fifty 13 were female. The lesion appeared on the right side in 62 cases, and the left side in 37; in 1 case both sides were simultaneously involved—the right side containing omentum and a loop of bowel and the left side omentum only.

History.—The surprisingly large number of 42 patients had no previous history of hernia, the symptoms and signs of strangulation beginning synchronously with the appearance of a lump. In a few cases the onset was associated with some definite action likely to raise the intra-abdominal pressure—e.g., a fit of coughing, straining at stool. Several of the more chronic cases of large hernia which were found at operation to have massive adhesions of the contained omentum to the sac wall gave a history of chronic dyspepsia of a flatulent type. The history often began with a sudden increase in the size of the hernia, or one which had previously been reducible became suddenly irreducible.

CLINICAL PICTURE

The onset of strangulation was characteristically ushered in by pain and vomiting, the former being present in no less than 97 cases. The duration of pain and vomiting varied from 3 hours to 14 days, with an average period of 2·6 days before operation. Those cases which needed some further operation on bowel, not necessarily amounting to resection, had a history of strangulation averaging 4·3 days, the longest being 14 days and the shortest 10 hours.

The individual reaction to pain makes it difficult to differentiate such terms as "excruciating pain," "very severe pain," "acute pain," but generally speaking it may be said that in the initial stages the more severe the pain the more serious the pathological processes in the sac, and hence the more urgent the need for operation. In the later stages, however, it is significant that of the 3 cases without pain 2 contained non-viable gut.

The symptom of pain was referable to two anatomical sites:—

(a) *Abdominal pain.*—Most of the patients complained of pain in the abdomen, the exact localisation varying.

1. Mid-abdominal colicky pain of varying intensity. There were 65 cases in this group, and the sac contents were always omentum and small bowel, separately or together.

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2. Epigastric pain of a continuous gnawing type was noted in 4 cases and was associated with epigastric tenderness in addition to the local hernial signs. These symptoms led to a laparotomy in one case on account of the negative clinical signs of femoral hernia; a possible explanation of epigastric pain was found, since the hernial sac contained a loop of jejunum from near the duodenojejunal flexure, and high enough up to exert a strong pull on the mesentery, so that this was stretched like a tight band across the abdominal cavity. It is suggested that this pull high up on the mesenteric root is the cause of the epigastric pain and tenderness in strangulated hernia.

3. Lower abdominal colicky pain occurred in 7 cases, 5 of which contained omentum, and 2 large bowel. It is a well-known fact that pain of hind-gut derivatives tends to be referred to the lower abdominal segment, and a possible explanation is that in this group the omentum concerned had been derived from the distal part of the transverse colon, causing a pain similar to a large gut strangulation itself.

(b) *Pain at the site of the hernia* was reported in only 26 cases, and in 19 of these there was no associated abdominal pain. Local pain is far more common in inguinal hernia, perhaps because here the sensitive anterior peritoneum is involved; from its anatomical site at the lower extremity of the peritoneal cavity a femoral-hernia sac may arise from the comparatively insensitive posterior peritoneum.

Vomiting was present in 84 cases and tended to appear later than the pain, in some cases by as much as twenty-four hours. In the 16 cases in which it was absent only one had a bowel lesion of note—a gangrenous constriction ring. Severe lesions were associated with vomiting, and in 4 cases of early fæcal vomiting gangrene of the bowel was present.

Histories of increasing severity of bowel action were inconclusive; the patients presented a varying picture from absolute constipation to severe diarrhœa; no definite relationship to any particular type of pathology was demonstrable.

PHYSICAL SIGNS

The signs conformed largely to textbook descriptions, but local tenderness was often absent. Strangulation has indeed been often missed because of lack of pain on palpation of the hernia, since this sign is usually looked for above all else. In 21 cases there was no tenderness; and three-quarters of those patients in whom the symptoms and signs of strangulation had persisted for two days or more (16 cases) had complete or incomplete gangrene or the viscera concerned. Thus, provided that the other criteria of strangulation are present the absence of tenderness is a danger signal rather than a reason for complaisance. Another type of case in which there is absence of local tenderness is a large sac with a small knuckle of bowel at the neck, especially if there is much fluid or omentum in the sac.

(a) Tenseness of the sac was always present, unless the sac was large or had not yet filled with fluid (i.e. in the very early stages).

(b) The cases showed that absence of a cough impulse is not to be regarded as a useful sign in strangulated femoral hernia because of the relatively long and tortuous track the hernia takes and because of the proximity of the large femoral vessels which may convey a cough impulse to the neighbouring hernia.

(c) Discoloration of the hernia is a sign worth noting; in 6 of 9 cases recorded gangrene of the bowel was present.

(d) Of the general signs the temperature varies considerably and is not reliable; 3 recorded temperatures of 100° F. or over at operation had gangrenous bowel, but the typical temperature is low. Likewise the pulse is unreliable, and though the characteristic picture of non-viable sac content is low temperature and high pulse-rate they are too inconsistent to be relied upon.

(e) Abdominal distension was recorded in only a few cases and bore no constant relationship to the hernia contents and the pathology thereof. Visible peristalsis was rarely seen.

Richter hernia was found in 7 cases; the hernias were small, tense and tender. There was only a very short, if any, previous history of hernia and the symptoms tended to be less definite than in strangulation of the complete circumference of the bowel.

TREATMENT

Reduction should be accomplished by operation. The importance of emptying the bladder immediately before operation cannot be over-emphasised, and catheterisation on the operating table both in cases of male and female patient is recommended as a routine practice.

Operation.—The Lotheisen exposure was used in most of the cases under review; the incision lies above and parallel to Poupart's ligament, and extends upwards from immediately outside the pubic spine for 4 or 5 in. A satisfactory exposure of the sac is obtained by reflection of the lower flap.

Three methods of anæsthesia were employed in this series: general, spinal and local. Local anæsthesia was used in just half the cases; and its use can be strongly recommended as a routine, since the pathological conditions in a hernial sac are never known beforehand, and long general anæsthesia, such as may be necessary for bowel resection, can determine a fatal issue. With local anæsthesia the time factor is not nearly so important and a difficult reduction and resection can be effected without hurry. The danger associated with the vomiting of intestinal obstruction which may lead to aspiration pneumonia in patients under inhalation anæsthesia is also avoided, and postoperative chest conditions are fewer. In the administration of local anæsthesia, the field block suggested by Labat was followed for the most part, except that before opening up the transversalis fascial layer about 30 c.cm. of 0·5% procaine hydrochloride was instilled under it (Tanner).

—	Cases	Died	No gangrene	Died	Gangrene	Died	Mortality-rate in gangrene cases %
Local	50	10	34	2	16	8	50
General	32	3	29	..	3	2	66
Spinal	18	..	18	..	..	..	..

The use of spinal anæsthesia in 18 cases showed good results, but unfortunately its use is impracticable in very ill patients and is to be deprecated in those which have a systolic blood-pressure of under 120 mm. Hg at pre-operative reading. Apart from these contra-indications there is no reason why it should not be employed.

RESULTS AND FINDINGS

Although the femoral hernia contents may vary considerably the findings in this series have been fairly constant:—

Small gut only	63
Small gut with omentum	23
Omentum only	8
Appendix	3
Large bowel	2

One empty sac was found at operation.

There are no special features peculiar to any group except that omentum usually gave a less definite clinical picture than bowel involvement and that large bowel herniation was always on the left side. The mortality for the 100 cases was 14, and of these fatal cases 11 showed gangrene of the contents.

Small gut strangulation was found in 86 cases. In this group 20 cases had gangrenous bowel and gangrene was sufficiently extensive to require gut-resection in 12 of these: of this 12, 8 died, giving a mortality for resection of 66% for gangrenous small intestine. In 2 of these cases exteriorisation procedures were used; both died, and I am of the opinion that so few such cases recover that as a general rule it is worth taking the extra risk and completing the anastomosis.

In the other 8 cases gangrene was incomplete and more minor procedures such as inverting a gangrenous patch, oversewing a non-viable constriction ring or wrapping omentum round a non-viable area were carried out. Of these cases 2 died—one from pneumonia three weeks later.

Of the other 66 cases, 4 died—all of them having gut and omentum strangulated.

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Omental strangulation alone was found in 8 cases. The omentum required resection in 4 of these; there was no mortality in this series. The vermiform appendix was present 3 times in the sac; in 2 of these it was strangulated itself, and in the other merely associated with strangulated omentum. The large bowel was found strangulated on 2 occasions. In one of these strangulation of an appendix epiploica was the main lesion.

Type	Cases	Died	Mortality-rate %
(A) Non-gangrenous bowel and omentum ..	66	4	6
(B) Gangrenous bowel: resection	12	8	66
(C) Gangrenous bowel: minor procedures	8	2	25

A review of the time factor in those cases where gangrene was found is interesting. The cases which died had a history lasting on an average over six days: whereas the patients belonging to this group that lived had been ill on an average for three days only. This is but another pointer to "remember the hernial rings," and thus establish an early diagnosis.

DISCUSSION

The fatality-rate of strangulated hernias is closely related to the existence and extent of the implicated bowel, which are mainly influenced by the lapse of time permitted to intervene between strangulation and operative release of the gut. Frankau (1931) clearly demonstrated the rising mortality that keeps pace with days of ignorant or indolent procrastination: thus on the first day the mortality in his collected series of cases of strangulated femoral hernia was 3·7%; on the second day 18%, on the third day 23%, on the fourth day 16%, and on the fifth day 27%.

The 14% mortality over all cases of the series approximates remarkably closely to the figures quoted by Vaughan Hudson and his colleagues (1941) for their collected cases, and doubtless the two series are comparable in the percentage of cases demanding gut resection. The hitherto devastating fatality attending the operative treatment of strangulated hernia where gangrenous bowel requires resection contrasts most strikingly with the relatively small risk which characterises operation on patients whose gut is still viable. The mortality of any series of cases of strangulated hernia therefore depends upon the proportion of the more severe type of injury to the intestine; the death-rate is also some index of the professional alertness of the staff of the hospital or of those who practise just beyond the shadow of the institution walls.

The last few months, however, have brought further hope to those whom ignorant delay threatens to overwhelm. Hudson and Smith (1942) have produced not only experimental, but also chemical proof of the great value of intraperitoneal sulphanilamide in cases of grave general peritonitis or gross peritoneal contamination, and have shown a remarkable reduction in mortality, from 55·5% to 8·3% in two comparable groups of cases, (a) where oral intravenous or intramuscular sulphanilamide or sulphapyridine was employed, and (b) where the drug was powdered and instilled into the peritoneal cavity. This remarkable figure of 8·3% mortality associated with intraperitoneal sulphanilamide in their series even approximates to the 6% fatality in the non-gangrenous cases—and is in striking contrast to the heavy mortality of the gangrenous cases—in the series recorded here.

Despite the ground for hope given by local sulphonamide therapy even in severe cases, the prevention of intestinal gangrene by timely surgery must always be preferable to its cure by resection with its many anxieties. It behoves the doctor and also the surgeon to "remember the hernia rings."

SUMMARY

A review of 100 cases of strangulated femoral hernia is presented. The erroneous diagnosis which almost invariably accompanied these cases on admission is stressed. A reduction in the total mortality of any series can only be attained by earlier diagnosis and earlier operation.

Intraperitoneal sulphanilamide therapy offers hope of an improved mortality-rate in cases where bowel resection is necessitated by reason of intestinal gangrene.

I wish to thank Dr. W. Allen Daley, MOH to the LCC, and Dr. N. S. Craig, medical superintendent of St. James' Hospital for access to material for this paper; and Mr. H. K. Vernon, FRCS, and Mr. N. C. Tanner, FRCS, for their helpful suggestions in its compilation.

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EARLY DIAGNOSIS OF WOUND INFECTION

WITH SPECIAL REFERENCE TO MIXED INFECTIONS

D. McCLEAN, M B LOND H. J. ROGERS, B SC LOND

(*From the Lister Institute of Preventive Medicine, Elstree*)

WE recently described [1] methods for the detection of hyaluronidase and lecithinase of bacterial origin in the exudates of wounds, and suggested that the experimental results should be applied to the examination of clinical material. Further work on mixed infections has revealed facts which lead us to recommend some modification of the tests we described for determining the nature of the bacterial source of the hyaluronidase by means of antisera.

Infection experiments were performed on groups of guineapigs, and the methods of infection and testing employed were the same as those described in our previous paper.

EXPERIMENTS AND RESULTS

Before experiments with mixed infections were performed it was thought advisable to investigate the influence of injecting follow-up doses of testicular hyaluronidase into the muscle of guineapigs already infected with non-hyaluronidase-producing strains of *Clostridium welchii* and *Cl. œdematiens*. In the *Cl. welchii* experiment 130 viscosity-reducing units (V.R.U.) of testis enzyme were injected 3, 6 and 24 hours after infection. In the *Cl. œdematiens* experiment the same dose was given 4·5 and 12 hours after infection.

The non-hyaluronidase-producing strain of *Cl. welchii* alone produces an infection which is relatively localised and accompanied by the "sticky" œdema with a honey-like consistency, containing hyaluronic acid, that was described in our previous paper. The addition of testicular hyaluronidase completely alters the clinical appearance of the infection; there is rapid extension with fluid œdema extending from the injected thigh to both axillæ. The testicular enzyme can be detected in the œdema fluid. The addition of this enzyme does not, however, cause any significant decrease in the survival-time.

The non-hyaluronidase-producing strain of *Cl. œdematiens* alone produces an intensely hæmorrhagic state in the infected muscle and moderately localised gelatinous œdema. The addition of testicular hyaluronidase does not alter the appearance of the muscle or the character of the œdema, but it causes a more rapid extension of the infection to the uninfected side of the body. The testicular enzyme can be detected in the œdema fluid, and in this infection the addition of the enzyme causes an apparently significant decrease in the survival-time.

It was decided to observe the influence of hyaluronidase-producing staphylococci and streptococci on infections with non-hyaluronidase-producing strains of *Cl. welchii* and *Cl. œdematiens*. A preliminary experiment was carried out to observe the results following intramuscular injection of the staphylococci and streptococci alone. The guineapigs appeared well for four days. At autopsy it was found that the staphylococci had caused a localised abscess in the muscle, but that no macroscopic lesion could be detected in the animals infected with streptococci.

Mixed infections produced by either *Cl. welchii* or *Cl. œdematiens* together with staphylococci or strepto-

1. McClean, D., Rogers, H. J., Williams, B. W. *Lancet*, 1943, i, 355.

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cocci result in a change in the character of the infection comparable with that caused by the addition of testicular hyaluronidase. The extension of the infected area due to the presence of the hyaluronidase-producing aerobe is more marked than that caused by the testicular enzyme. Both the staphylococci and streptococci are found in the œdema fluid in numbers approximately equal to those of the accompanying anaerobe. This is in striking contrast to the failure of either the staphylococci or streptococci alone to initiate a generalised infection. Staphylococcal or streptococcal hyaluronidase is present in high titre in both the muscle extracts and œdema fluids. It is noticeable that whereas neither aerobe causes an appreciable decrease in the survival-time with the *welchii* infections they appear to decrease the survival-time in *œdematiens* infections. Further observations on larger groups of animals with graded doses of the infecting agents are necessary to determine accurately the influence of these mixed infections on the survival-time.

It appears from these observations that the presence of a hyaluronidase-producing aerobe in a wound together with a non-hyaluronidase-producing member of the gas-gangrene group may profoundly modify the character of the infection produced by the latter organism and that, although the infection may have the clinical character of gas-gangrene, the hyaluronidase present in the exudate will be derived from the accompanying aerobe. Further observations showed that if a hyaluronidase-producing aerobe accompanies a hyaluronidase-producing member of the gas-gangrene group, then not only will both organisms be found in the tissues, but hyaluronidase from both bacterial species will be present in the exudate. This will complicate the diagnosis of the bacterial source of the hyaluronidase found in the wound exudate, since none of the monovalent anti-hyaluronidase sera recommended for use in our previous communication will neutralise all the enzymes present in a wound exudate due to mixed infection of this type. For this reason we recommend that the polyvalent sera described below should be used in neutralisation tests to determine the bacterial source of enzymes present in wound exudates.

1. *Polyvalent anti-hyaluronidase serum* contains anti-hyaluronidase to *Cl. welchii, Cl. septicum,* staphylococcus and streptococcus groups A and C. This serum should neutralise the enzyme present in the wound exudate from any or all of the above species. If hyaluronidase is encountered in a wound exudate which is not neutralised by this serum it must be derived from some other species, for which suitable sera are not available. We have found the following titres of anti-hyaluronidase adequate to neutralise the amount of enzyme produced in any experimental infection.

Cl. welchii anti-hyaluronidase	50 to 100	units/ml.	
,, *septicum* ,,	,,	30 ,, 50	,, ,,
Staphylococcus ,,	,,	10 ,, 50	,, ,,
Streptococcus ,,	,,	10 ,, 50	,, ,,

One anti-hyaluronidase unit is the amount of antibody required to neutralise one viscosity-reducing unit of enzyme.

2. *Cl. welchii diagnosing anti-hyaluronidase serum* contains anti-hyaluronidase to *Cl. septicum,* staphylococci and streptococcus, but not to *Cl. welchii.* Therefore a positive test in the presence of this serum coupled with a negative test in the presence of the polyvalent serum indicates that the enzyme has been produced from *Cl. welchii.*

3. *Cl. septicum diagnosing anti-hyaluronidase serum.*—Similarly this serum contains anti-hyaluronidase to *Cl. welchii,* staphylococcus and streptococcus only and a positive result will indicate the presence of enzyme from *Cl. septicum.*

4. *Staphylococcus diagnosing anti-hyaluronidase serum.*—Staphylococcus anti-hyaluronidase has been omitted from this serum and therefore a positive result with it coupled with a negative result with the polyvalent serum indicates that the hyaluronidase is derived from the staphylococcus.

5. *Streptococcus diagnosing anti-hyaluronidase serum.*—Group A and Group C streptococcus anti-hyaluronidase have been omitted from this serum. A positive result with it coupled with a negative result with the polyvalent serum indicates that the hyaluronidase is derived from streptococci.

Lecithinase is only likely to be encountered in the presence of *Cl. welchii* infection, though traces of this enzyme may be produced by *Cl. œdematiens.* Therefore the monovalent sera already described containing anti-*welchii* and anti-*œdematiens* lecithinases should be used in the recommended tests for this enzyme.

SUMMARY

The influence of mixed infection by staphylococci or streptococci, together with organisms of the gas-gangrene group, on the character of the resulting infection is described. It appears that hyaluronidase-producing aerobes may increase the rate of spread of infection due to anaerobic organisms and may complicate the diagnosis of the organisms causing the infection.

It is recommended that polyvalent anti-hyaluronidase sera which are described in the text should be substituted for the monovalent sera previously recommended by us for use in determining the bacterial source of enzymes in wound exudates.

AN OUTBREAK OF TYPHOID FEVER

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IN December, 1941, there was an outbreak of typhoid fever among the staff at Devon Mental Hospital. There were many interesting features in this epidemic, and anti-typhoid serum and sulphapyridine were used in treatment. The nurses home to which the disease was confined catered for 97 mental nurses, 6 maids and 11 mental patients. In addition 8 CNR nurses slept at the home but had no food there. The maids and the mental patients had separate messes.

In all, 23 mental nurses and 1 maid developed frank attacks of fever, while 3 nurses had very mild attacks. In view of the fact that only those having food at the home were affected it seemed certain that the disease was food- or water-borne. The extremely local nature of the outbreak suggested infection of some article of food or the water by a carrier. Specimens of water from every tap gave negative results. The milk, which was supplied to all the hospital from the same source, was unlikely to be the vehicle unless infected locally. The bulk supplies were tested with negative results. The stools of all milkers and of those who delivered milk to the home were also examined without finding a carrier. The joints of all drains were tested and proved to be sound.

A thorough search for a carrier was begun among all those who were connected with the nurses home. Eventually a woman mental patient, Mrs. X, was found to be excreting the bacillus freely. Her history showed that in 1937 she had been associated with a small outbreak of typhoid fever in a house on Woodbury Common, South Devon, where she had gone after discharge on trial. At that time she was returned to hospital as a contact, but examination failed to discover the bacillus and after some weeks of isolation she was allowed to mix with other patients. She had been at the nurses home for three months before the outbreak; her duties there were mainly of the charring type but from time to time she laid the tables in the nurses dining-room and helped to carry the food from the serving table to the dining table. She was so employed at the relevant time and it seems likely she heavily infected either the drinking water or some article of food. It is significant that the only maid who contracted the disease worked in the dining-room with her. There is no history that Mrs. X ever had typhoid fever. She is still excreting the bacillus (November, 1942).

A great help in elucidating the epidemic was the typing of the organism, done by Dr. Felix at the Lister Institute. Cultures from all infected nurses proved to be type C. It was important therefore to determine the type excreted by Mrs. X; this also was type C, a very strong point in favour of her being responsible. Before and during the epidemic here other cases of typhoid fever were being reported in neighbouring districts to which some of our nurses had easy access. In past years an attempt would have been made to relate all these cases to one source of infection. Typing, however, proved they had nothing to do with our epidemic, so that the field of investigation was much narrowed. In this hospital there are at present, besides Mrs. X, 4 typhoid carriers. These were all typed to eliminate the infection of a nurse by one of them; there was 1 type A and 3 type F1, so that they could be eliminated as suspects. Thus the

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type of organism in the epidemic clearly pointed to Mrs. X, and it is now accepted that she was the cause of the outbreak. It is impossible to overemphasise the value of typing the organism in tracking down the extent of the epidemic and the likely source of infection.

VALUE OF INOCULATION

The outbreak gave an opportunity to record the incidence of infection in those inoculated against typhoid fever, and also enabled one to assess the effect inoculation had on the course of the disease. Between 1938 and 1941, 50 members of the staff and all 11 patients concerned were inoculated with the ordinary heat-killed phenol-preserved TAB. The results were:

—	Total	Inoc. 1938	Inoc. 1941	Not inoc.	Inoc. (%)
Staff	103	46	4	53	48·5
Patients ..	11	10	1	0	100
Incidence of fever.					
Staff	27	10	4	13	52
Patients ..	0	..	..	..	..

Inoc. = inoculated.

Thus in the staff the incidence of fever in the protected and non-protected was more or less the same. It is true the majority were inoculated some 3 years before the infection, yet all 4 protected in 1941 contracted the disease. Of the 27 cases, 17 were seriously ill while 10 had mild attacks; 7 of the serious cases had been protected in 1938 or 1941; 1 of these, the only nurse to die during the epidemic, was inoculated in July, 1941. She became ill on Jan. 3, 1942, and died on Jan. 11, half an hour after a profuse hæmorrhage. Another nurse inoculated with the same batch of vaccine at the same time also contracted the disease.

Of the 10 mild cases, 7 had been protected; 2 of the 3 unprotected cases were inoculated during the epidemic and were found having very mild symptoms and excreting the bacillus 10 days after the second injection. Only 1 of the mild cases had no protection whatever. Thus while inoculation did not appear to give much protection against an attack those who were inoculated had a better chance of a mild attack. This was the only effect observed, since the course of the disease in the more serious cases did not seem to be influenced by inoculation and relapses were common to both types.

As soon as the diagnosis of typhoid fever was made all staff and patients were inoculated with heat-killed TAB. After this, 6 nurses contracted the fever, 3 severely; 2 of these, however, had had only one injection on the eve of symptoms appearing. Since the bulk of the fever cases developed between Dec. 20 and Jan. 4, it may be that the protective inoculation had some limiting effect, but it is more likely that the prompt isolation of the suspected carrier was the important factor.

There has been some dissatisfaction in recent years with the protection afforded by the ordinary TAB vaccine. Since this epidemic we are now using in this hospital the alcohol-killed, alcohol-preserved TABC.

RESULTS OF TREATMENT

Of the 27 nurses, 22 were treated in this hospital; 6 were given antityphoid serum containing Vi antibodies obtained from the Lister Institute. Another nurse (case 2 below), who contracted the fever in June, 1942, from one of our carriers (type F1), was also treated with serum. There have been some published results of the use of this serum, the most recent being those of Pijper and Crocker (1939) in South Africa, and Landor (1941) in Singapore. Earlier contributions were made by Felix (1935, 1938) who first prepared the serum containing Vi antibodies, McSweeney (1935), Robertson and Yu (1936) and Cookson and Facey (1937). Most agree that the new serum has possibilities and should be used wherever indicated.

The serum was given in three daily doses of 33 c.cm. intramuscularly. Apart from serum rashes there were no unpleasant symptoms. Unfortunately, in most cases the serum was given late, but there could be no doubt of the clinical benefit. The temperature in all cases began to drop after the injections and the patient became more comfortable and less toxic. In 2 cases in which the serum was given at the best time (in the first week) the result was immediate and remarkable. All the patients recovered. Here are two illustrative cases.

CASE 1.—Aged 22. Fairly toxic and becoming weak. Average temperature 102° F. Serum given on 13th, 14th and 15th days. Temperature fell quickly and became normal on 18th day. The rapid general improvement was striking.

CASE 2.—Aged 20. This case appeared in June and was not connected with the earlier epidemic; directly infected from a carrier patient, Bacillus recovered from blood and fæces. Serum given on 4th, 5th and 6th days. Temperature (which averaged 103° F.) fell by crisis on 8th day and from 9th day onward was normal. The result here was dramatic, and although she was protected in January, 1942, there can be no doubt that the early administration of serum was curative.

In view of the unfavourable reports on the use of sulphonamides in typhoid fevers, it may be of interest to record our experience. A group of 8 patients were treated with sulphapyridine. The dosage was generally one tablet (0·5 g.) 4-hourly. In 3 cases it was raised to 2 tablets 4-hourly. The total amount given varied between 5 g. and 19 g. In all cases sulphapyridine depressed the temperature. In 4 cases this effect was not maintained and the drug was stopped because of untoward symptoms, 2 patients becoming cyanosed, 1 becoming sick, and 1 developing irregular heart action. In the other 4 patients the temperature fell to normal, after varied intervals, and all can be considered to have benefited from the drug. None showed the slightest ill effect; the drug appeared to be well tolerated. The following are 2 cases which improved.

CASE 3.—Aged 27. Not inoculated. Very toxic. Average temperature 102·5° F. Drug given on 7th and 8th days (5 g.). Temperature fell at once and reached normal by slow lysis on 14th day. Toxæmia was greatly lessened and the whole attack appeared to be cut short.

CASE 4.—Aged 20. Inoculated July, 1941. Sulphapyridine given on 2nd to 5th days (9 g. in all). Whole condition improved immediately and temperature fell to normal on 7th day. This illness had a sharp onset, temperature reaching 103·8° F. on 2nd day. It is difficult to assess the influence of recent inoculation, but the only nurse who died during the epidemic was inoculated at the same time as this case with the same batch of vaccine. At the end of convalescence there was a mild relapse with low fever.

Clinically the serum-treated cases reacted more quickly, the general condition improving even before the temperature fell. We think that every case ought to have serum as soon as possible. In a long epidemic, however, it is the early cases that are likely to be given serum late owing to the difficulty of early diagnosis. In these cases sulphapyridine should be of value. The later cases should be given serum at once, even before a definite diagnosis is made. Sulphapyridine gave very good results and the untoward symptoms often described were not much in evidence. The 4 patients who did not tolerate it well were not unduly upset; the drug was stopped because the patients were so ill and it was not considered wise to add to their difficulties. With careful supervision, such as is given in hospital, there is little risk in using sulphapyridine.

SUMMARY

An epidemic of typhoid fever is described in a nurses home catering for 114 staff and patients.

The incidence of fever was much the same in the inoculated and non-inoculated but the latter more often had a severe attack. Typing of the organism was of great value in limiting the scope of the inquiry and in pointing to the likely carrier.

Serum gave encouraging results in 7 cases; 8 treated with sulphapyridine did not show any ill effects, and 4 were benefited.

The outbreak was due to a carrier patient excreting type C bacillus.

I should like to thank Mr. A. Felix, DSc, for typing the bacillus and for his advice, Dr. J. C. Cruickshank and Dr.

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W. A. Robb for their help in the bacteriological work, and Dr. J. Dean for his clinical work.

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HYPERPYREXIA SUPERIMPOSED UPON AN ATTACK OF ACUTE TONSILLITIS

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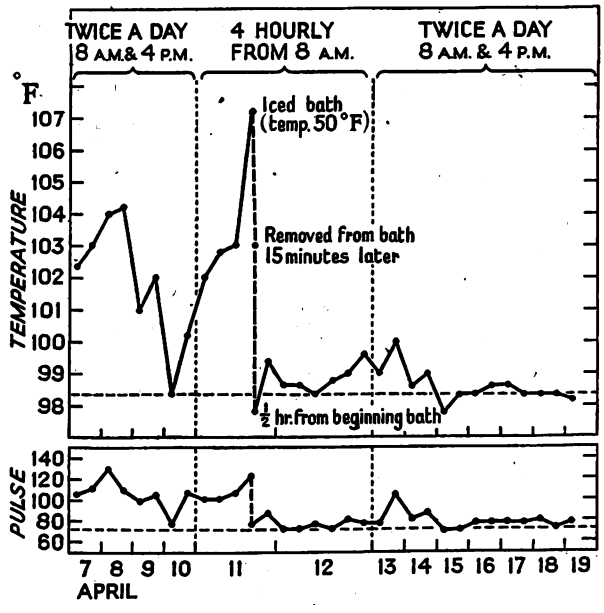
SURGEON LIEUTENANT RNVR

THE following case illustrates the way in which hyperpyrexia may supervene on a febrile illness.

The time was April, 1942, and the place was the sick-bay of one of His Majesty's larger warships stationed then (and for about the previous 2 months) on or within a few degrees of the equator. The weather was completely cloudless and windless, and the 12 hours odd of sunshine each day kept the temperature in the sick bay permanently over 90° F. and usually nearer 100° F., day and night. At night, the temperature did not drop because, owing to the blackout, all hatches and scuttles (which were normally open by day and thus able to scoop in what little draught the ship made by virtue of its own forward motion) were shut. There was a forced ventilation system through trunks opening in different parts of the sick bay but this was poor, judged by present-day standards; for not only was the system old (she is an old ship), but the motors driving the fans could only be run at a slow speed for fear of burning them out.

A joiner, aged 24, first reported at the sick bay on April 7, 1942, complaining of a sore throat of some 48 hours standing. His temperature was 102·4° F., pulse-rate 104. Bowels



not open for 2 days. His pharynx and fauces were very red and injected and both tonsils were covered with white exudate. The submaxillary glands were enlarged. In the lungs nothing abnormal was found. The urine was acid and contained no sugar or albumin. In short, he had a typical attack of acute tonsillitis. He was put to bed and given a powder of aspirin gr. 5, phenacetin gr. 5, caffeine gr. 2; and a colocynth purge. He was ordered hot gargles, and given two sulphanilamide tablets, thrice daily; fauces and tonsils were painted with Mandl's paint twice daily.

During the next two days his temperature remained in the neighbourhood of 102° F. but he seemed to be making good progress, the tonsils cleaning up well. On April 10, however, though his temperature at 8 AM was normal and his throat and tonsils showed very little inflammation, he complained of feeling very rotten. He had been delirious the previous night. It was thought that the sulphanilamide tablets on top of the severe toxæmia were responsible for these symptoms and they were accordingly stopped. At 4 PM his temperature had risen to 100·2° F. and his pulse-rate to 106. At 11.30 PM he was again delirious and behaving in an odd fashion. He got out of his bunk, rolled it up and started walking away with it. His conversation was rambling. On being directly questioned, he stated that he had no headache. He was rather inclined to cry. It was noted that his skin was very dry. A brief examination of the central nervous system then showed his knee-jerks and ankle-jerks to be absent in both legs. Both Babinski reflexes were positive. His abdominal reflexes were all present, however, and Kernig's sign was negative. There was no neck rigidity. His temperature was 102·4° F. and his pulse-rate 110. A bromide and chloral sedative was administered and a constant watch kept on him.

On April 11 his temperature at 8 AM was 102° F., his pulse-rate 100. Throat clean and very little inflamed. He was completely rational. At 4 PM, his temperature being 103° F., he was given a tepid sponging. At 8 PM his temperature was found to be 107·2° F. and he had ceased to sweat. He was drowsy rather than delirious and was perfectly capable of giving a rational answer when spoken to. All devices for rapidly cooling him were accordingly forthwith instituted. Bearing in mind the environment of the patient in a hot blacked-out sick-bay, this was easier said than done. The water-supply throughout the ship was permanently tepid. While large blocks of ice were being obtained from the ship's refrigerator to cool down a bath of water, the patient was laid on the sick bay table over which a large deck-head fan was playing; two smaller table fans were directed at him—one from the head end of the table and the other from the region of his feet. His naked body was covered with a wet sheet and as the water evaporated from this more was sprinkled on.

The bath was meanwhile soon reduced to about 50° F. and he was then supported to it. Within 15 minutes of immersion his temperature dropped to 103° F. and he was (much against his will) removed from the bath on to his bunk. Here, with table fans playing upon him, he was again covered with a wet sheet. Half an hour from the moment he was first put into the bath, his temperature was down to 97·8° F. From that moment he never looked back. The wet sheet was removed an hour later and he settled down for the night with just one fan running somewhere in the vicinity to ensure some movement of air.

On April 12 he felt much better, his temperature remaining throughout the day in the region of 99° F. Normal sweating did not begin again until the evening. On April 13 his temperature fell to normal and remained there until his discharge back to duty on April 19.

The temperature chart is self-explanatory. Morning and evening temperatures only are shown each day except on April 11 and 12—the two critical days—when 4-hourly readings are recorded.

HISTOLOGICAL EFFECT OF PROFLAVINE POWDER ON FRESH WOUNDS

FRANK HAWKING, D M OXFD

(*From the National Institute for Medical Research*)

THIS note is written to describe the histological effect of applying acridine antiseptics as powder to clean experimental wounds. Mitchell and Buttle[1] have reported that the application of powdered proflavine sulphate to chronic suppurating human wounds often produced great improvement. Russell and Falconer[2] have recently described experiments in which acridine antiseptics were applied as powders to the brains of rabbits; extensive necrosis was caused in every case. The present experiments show that necrosis is similarly caused by the application of acridine antiseptics to wounds in subcutaneous tissue.

Rats were anæsthetised, an incision was made in the flank, and the skin was lifted up over an area of about 3–4 sq. cm.; 10 mg. of the powdered antiseptic was inserted into the pocket thus formed and distributed. The opening of the wound was then loosely sutured. The rats were killed at intervals of between 2 and 20 days and the site examined by the usual histological methods. Proflavine hydrochloride was tested on six

1. Mitchell, G. A. G. and Buttle, G. A. H. *Lancet*, 1942, ii, 416.
2. Russell, D. S. and Falconer, M. A. *Ibid*, 1943, i, 580.

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animals, proflavine salicylate, proflavine *p*-hydroxy phenyl sulphonate, proflavine hydroiodide, neutral proflavine sulphate (Boots), proflavine base, and 5-aminoacridine hydrochloride were each tested on four animals; fourteen untreated wounds were observed as controls. It was hoped to find some derivative of proflavine which would be less soluble and less acid or alkaline in solution than proflavine sulphate, and therefore less harmful. Proflavine base is soluble in water, 1 in 3000 at 20° C., and the pH of the saturated solution is 8·6. The corresponding figures for the other compounds are: salicylate 1 in 1700 and 6·9; *p*-hydroxyphenyl sulphonate 1 in 420 and 5·9; hydroiodide 1 in 240 and 6·8; 5-aminoacridine hydrochloride about 1 in 300 and 6·7.

The control wounds healed rapidly with only very slight inflammatory reaction, and by the 10th day the site of the wound was almost indistinguishable from the surrounding skin. In the treated wounds there was great effusion of fluid in the connective tissue planes between the muscles of the abdominal wall and the skin; and necrosis of the skin, subcutaneous tissue and portions of the muscles of the abdominal wall occurred. In the more severe cases the necrosis extended as far as the peritoneal surface. The necrotic tissue gradually separated and by the 20th day an ulcer was usually left measuring 0·5–2 cm. across. It was difficult to distinguish any great difference of toxicity between the various compounds studied; proflavine salicylate seemed slightly less harmful than the others and proflavine base slightly more harmful, but the series is too small for these conclusions to carry any weight.

It was concluded that, although acridine antiseptics as powder may be beneficial to chronic suppurating wounds, as Mitchell and Buttle report, their prophylactic application to fresh non-suppurating wounds will probably cause extensive damage, and is not to be recommended.

SUMMARY

Salts of proflavine and of 5-aminoacridine were inserted in powdered form into experimental wounds made under the skin of rats. Extensive necrosis occurred in every case. The application of these powders to fresh human wounds is not to be recommended

Thanks are due to Mr. A. J. Ewins, FRS, of May and Baker Ltd., for supplying many of the compounds; to Mr. F. J. Higginson for the histological preparations; and to Miss V. D. Markham for technical assistance.

Medical Societies

TUBERCULOSIS ASSOCIATION

AT its meeting in London on May 21, under the chairmanship of Mr. J. E. H. ROBERTS, the association discussed

War-time Diet and the Tuberculous Patient

Dr. H. A. ROSS indicated the lessons to be drawn from the effect of nutrition on belligerent and neutral nations in the last war. He maintained that at present an adequate number of calories is not difficult to obtain; what causes concern is the source of such calories. The average weight gain of patients in some of the sanatoria of the Welsh National Memorial Association in recent months compares favourably with the weight gained in the same institutions before the war.

Dr. C. H. C. TOUSSAINT of Bermondsey had the needs of the domiciliary patient particularly in mind. He took as a basis Diet No. 2 from the report of the BMA Committee on Nutrition. The diet provides over 3000 calories daily, and health and working capacity can be maintained on it over long periods. Rationing of meat, bacon, cheese, butter, fats and sugar has cut by half the amounts considered advisable in this diet. That applies particularly to first-class proteins. The allowance of two pints of milk daily to tuberculous persons almost compensates for this loss both in calories and proteins. Dr. Toussaint then compared the average weights of a group of patients when they were first seen at his dispensary between 1936 and 1939 with their weights during 1942–43. Of 39 sputum-negative patients only 5 showed a loss, while in 16 the weight remained stationary and in 18 it rose. Of 45 sputum-positive patients only 9 showed a loss, while in 22 the weight remained stationary and in 14 it rose. Apart from a shortage of vitamins B_1 and C (which could be added to the diet in synthetic form), Dr. Toussaint did not think that the present war-time diet was exercising a deleterious effect on his tuberculous patients.

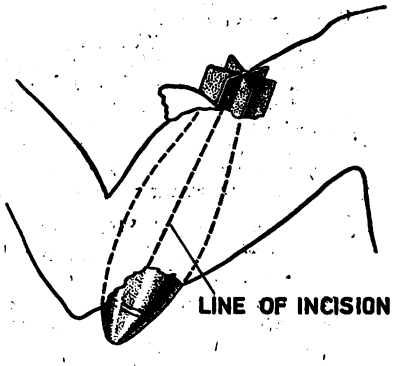
Dr. R. Y. KEERS gave a preliminary account of some experiments he had carried out at Tor-na-Dee Sanatorium. With the help of the Medical Research Council he has been able to give an extra fat ration to his patients equivalent in calories to the extra allowance of carbohydrate which Dr. George Day used in his published experiments at Mundesley. Dr. Keers found that patients receiving this extra fat at first gained weight more rapidly than the controls, but later digestive troubles were frequent, appetite became impaired and the additional fat could no longer be tolerated.

Prof. H. P. HIMSWORTH, secretary of the Medical Advisory Committee to the Ministries of Food and Health, said he was anxious to obtain a really reliable cross-section of opinion on this subject. It is true, he said, that the diet is different now from what it used to be, but he was of the opinion that it is nutritionally correct and that rationing is theoretically adequate. He went into the various components of the present-day diet in more detail. As far as the vitamins are concerned the intake of A and D is practically unchanged, thanks to vitaminised margarine; wheatmeal bread has helped to avert any shortage of B; but he admitted that vitamin C is probably in poor supply in the late winter months and in the spring owing to the shortage of fresh fruit and the reduced yield from potatoes. Regarding minerals, the increased consumption of fresh vegetables has sustained the iron intake while the allowance of two pints of milk has provided the necessary amount of calcium. He dwelt on the interchangeability of carbohydrate and fat as opposed to protein for which there is no substitute. He showed that rationed commodities, plus protein derived from the extra milk allowance, from vegetables and from the addition of milk powder to bread, will provide 82 g. out of the 100 g. needed daily. This took no account of such sources of protein as tinned food and meals taken at communal feeding places.

In the general discussion the point was raised whether the tuberculous community should not be regarded for priority purposes with the "family" rather than the "individual" as the unit. It was suggested that there is a tendency for the healthy members of a family to go short in order to assist the invalid. Professor Himsworth said that the difficulties in the way of providing extra nourishment for family contacts are great. Apart from complexity of administration it must be remembered that when there is perhaps only just enough food to go round such a grant could only be made at the expense of healthy hard-working citizens. He would only be justified in attempting to do this if the evidence pointing to the need for it was sufficiently strong. The meeting was unable to produce the necessary convincing evidence.

MORTAR SHELL IN THE ARM

REMOVAL of unexploded missiles is becoming one of the natural hazards of the course to war surgeons, and the *Moscow News* of Oct. 17, 1942, gives an account of the removal of a mortar shell from the upper arm. A Red Army soldier named Yevtushenko was brought to a brigade dressing station on the Briansk sector of the front with the stabiliser of an intact mortar shell protruding from the left arm near the shoulder, and the nose showing near the elbow (see figure). It had fractured the humerus and lodged in the triceps. Working by the light of a paraffin lamp V. F. Babintseva, an army doctor of the third rank, undertook its removal. Her assistants held the forearm firmly, and a local anæsthetic was used; she removed the shell by dissecting the tissues along a line joining the stabiliser to the fuse. The man did well.



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Reviews of Books

The Pub and the People

Mass-Observation. (Gollancz. Pp. 350. 16s.)

THIS book is an intelligent piece of field research long overdue and on a subject too long neglected. Lip service is often paid to the aphorism that the proper study of mankind is man, but in practice it has usually been interpreted in one of two ways: either as a speculative inquiry into man's relation to his environment and his correct behaviour pattern, chiefly as an exercise in moral philosophy; or, as an inquiry into the habits and customs of the so-called uncivilised, savage portion of the species—presumably on the assumption that the investigator has already achieved a perfect adaptation. In this work we have the "investigator" studying himself, or at least people very little removed from himself. Trained observers, and a number of assistants more or less casually employed on special details, carried out the investigation, living and working for some years as wholly identified units in the city, and the book contains an analysis of the material gathered on the public-house-going activities of the population in an English industrial city.

Many local authorities are actively antagonistic to "the Trade"; beer is itself neither as potent nor as good as it was, although it is dearer; the standard of comfort in public houses has risen very little, while that of the contemporary scene has increased tremendously. These are all reasons for some decline in the popularity of pub-crawling. To offset them, there is a strict control over the issue of licences, and this has lessened competition. For instance, in 1848 there was a pub to every 170 inhabitants, in 1940 one to every 559. But in 1937 there was more money spent nationally on drink than on furniture, coal and footwear together; and it is the third item on the nation's bill of expenditure. Yet there is no doubt that pub-going as a regular habit among working men is decreasing, and in the course of this investigation it became clear that all the town's older institutions are declining—activities varying from participation in the political machine to pigeon-racing. They are being elbowed out of the way by football-pools, the cinema, dog-racing and the wireless. Metaphysical speculation on the nature of existence is a vital concern, and answers to the fundamental queries—why are we born, where are we going, what happens when we die, why is it all worth while, what active part in shaping our lives can we take—were formerly sought in the social activities covered by the church, political party, club, and public-house (as a more informal and uninhibited club-room). Each institution subserved an expressed or felt social need and function, and each encouraged coöperation for common ends. Thus each developed a series of customs and traditions, and those centred around the pub are discussed and analysed in this book. Contradictions bristle. Brewers advertise their wares to obtain maximum sales, their criterion being sales success, and are thus on a footing with the cinema, dance-hall, dog-track and radio in disclaiming or altogether ignoring any social obligation. Yet it also remains true that most landlords still think of their house as a place for their friends to meet, rather than a place of profits.

The detailed story of how and why, how much, where and when, the Worktowner drinks is fully described, together with an account of some of the sequelæ of drinking and related group reactions, such as the temperance movement. Some of the illustrative anecdotes are slightly tedious, an index is lacking, and misprints and bad punctuation are annoying; but the prefaced account of the difficulties of preparing and publishing the book at all are ample explanation, and it is to the credit of Mass-Observation that the task was attempted and some portion completed. Whatever views a reader holds on drink, this book shows that it forms a significant part of the working man's existence.

Short Textbook of Midwifery

(3rd ed.) G. F. GIBBERD, MS Lond., FRCS, FRCOG. (Churchill. Pp. 542. 21s.)

THE new edition of this deservedly popular book is handy, well turned out and readable. The teaching throughout is moderate and balanced, though not all obstetricians will agree with the remark on cæsarean section that "as a routine the upper segment operation is chosen if the patient is not in labour." Surely, even before the onset of pains and before the formation of a true lower segment it is usually preferable to extract the child through an incision made in the lower part of the uterus, thereby securing a pleasanter puerperium and avoiding the risk of postoperative adhesions to the scar. The chapter on hyperemesis has been revised in the light of Sheehan's work and many alterations have been made throughout. In his preface to the first edition Mr. Gibberd remarked that it is better that a book should from time to time stimulate the natural interests of the reader than that it should provide him with a complete set of facts; this happily written instructive volume amply supports such a thesis.

PLANNING BY HOSPITAL RESIDENTS

IN March, 1942, a number of hospital assistants and residents in Sheffield formed themselves into a group to discuss medical planning. They felt that men and women who had qualified within the last ten years, many of whom would shortly join the Forces, had too little representation on existing planning bodies. A series of discussions was held and at the end of these a questionnaire on the issues raised was sent to all assistants and residents in the Sheffield hospitals, voluntary and municipal. About a third filled them in: 18 of the 23 questionnaires thus returned were from men, 5 of whom are now serving in the Forces. The average period since qualification in members of the group was four years, graduates of seven British universities being among them. The following conclusions represent the opinion of three-quarters or more of those who completed the questionnaire.

1. The preventive and curative medical services should be integrated into one health service and should not be separately directed.

2. Hospitals should be coördinated and directed by regional councils, to be responsible to a National Medical Committee, in which 50% of the members should be medical men.

3. Hospitals should be coördinated within regions larger than the existing local government areas, and in each region a teaching hospital should act as the key hospital. Each hospital should be administered by a medical committee to appoint medical staff and direct medical matters; and a lay staff to direct general and financial matters.

4. Consultants should be associated with a teaching hospital and should receive a salary for their hospital work.

5. General practice should be carried out from health centres, each of which should cover a population of some 15,000 and be staffed by about 10 doctors.

6. Health centres should be coördinated with hospitals in the region and public health personnel. Services should be unified with general practitioners in health centres and the centre doctor should be encouraged to do some of the work now done by the public health department, provided he had undergone special training.

7. Doctors should be appointed to the centres by the regional medical authority and paid a basic salary in addition to a capitation fee for each patient up to a maximum of 2000.

8. A more uniform qualification is desirable and a resident hospital appointment following qualification should be required before admission to the register.

9. In the appointment of medical teachers more consideration should be paid to the candidate with ability to teach. Most of the group felt that though teachers should be allowed to do research they should not engage in private practice or accept public appointments. It was thought that the general practitioner should play some part in the teaching of students.

10. Research departments should be created in all teaching hospitals with a paid director whose duties would include initiation and coördination of research.

11. The doctor should be paid, not directly by the patient or through doctors' clubs, but either through an insurance scheme open to the whole population or by the state on a salary basis with pension, or by a combination of these two methods.

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THE LANCET

LONDON: SATURDAY, JUNE 5, 1943

WHERE WE STAND

WE are in favour of a comprehensive medical service. We are not in favour of direct employment of general practitioners by local authorities or by the state. Most of the medical profession would, we believe, agree with us in these two opinions, and we hold that they are not incompatible.

The purpose of a comprehensive service is to meet the medical needs of the people. Apart from public-health activities, these needs, essentially, are two—hospital care and personal care—and no service would be comprehensive which developed one to the detriment of the other. The first and more obvious purpose of medical reform is to make scientific resources available to everybody; and reformers are apt to think of no other. But it may be equally important to the public to ensure that personal care of high quality is also available to them. One part of medicine can be practised only by doctors in groups, working with nurses and other auxiliaries in hospitals; but another part is best undertaken by doctors working as individuals. It is true that many of our people have never had personal care and set little store by it. It is also true that personalities may count for less in Russia, or Utopia, or 2043, than they do here and now. The average Britisher of today, however, wants not only the benefits of science but also the help of an individual doctor—*my doctor*—who will advise him, and interpret to him, and accept medical responsibility for him and his family. A comprehensive service should provide both hospital care and personal care at their best.

For the better application of scientific methods we must have better hospitals as soon as possible, and meanwhile better use of those there are. It is generally accepted that the hospitals of an area must be grouped to form a regional service, and the main question outstanding is who should manage these services. They might be administered by the Ministry of Health through regional offices; or by a semi-independent National Medical Corporation formed for the purpose; or by local-government authorities. Direct control by the Ministry has found few advocates, and medical opinion has preferred the idea of a corporation in which doctors, laymen and the Ministry would be represented. But the Government, rightly or wrongly, is unwilling to entrust a new corporation with the responsibility of running all the hospitals of this country, three quarters of which at present belong to municipalities. Its own solution is to form statutory health authorities for each hospital area and put the service in their hands. To meet objections based on painful experience, it would make the areas far larger than those of existing health authorities, and it would safeguard or improve the position of hospital medical officers by setting up advisory medical committees throughout the services and by giving doctors representation in the health authority itself. We hold strong views on the need for every hospital officer, senior or junior, to enjoy personal responsibility in his work, and we have lately deplored the state of affairs in many municipal hospitals where professional freedom is all but dead. Nevertheless we recognise good reasons why public institutions should be administered by the people of the locality; we think the proposed safeguards valuable; we are content that hospital staffs should be paid by salary; and—though we should prefer it otherwise—we see no fundamental reason why the salaries of doctors working as a group in hospital should not be paid directly by a local authority.

The payment of the family doctor is another matter. We agree that, for convenience, he should normally work as one of a small group, with the facilities of a health centre at his disposal; but, if personal care is to reach its highest level, each individual citizen should wherever possible have a doctor of his own, freely chosen and freely changeable. The bond between the two should somehow be made personal: the patient is not contracting with the health centre—still less with a local authority—to cherish him in sickness and in health. A doctor employed and paid by a local authority could not give him the single-minded service he seeks; for such a doctor has ceased to be a free agent and is to some extent the agent of his employer. The traditional relation between doctor and patient, which is the proper basis for personal care, is profoundly modified when any third party, with a non-professional outlook, can claim the doctor's allegiance—when the patient can feel, rightly or wrongly, that his interests no longer come first. Therefore, if for no other reason, the family doctor should not be the paid servant of a local authority. The problem of disinterested certification, to which we referred last week, must have some other solution. In their discussions with the Ministry the Representative Committee must find means to rationalise medical service without destroying the psychological foundation of personal care.

If it is politically impossible or inadvisable to entrust a comprehensive service, with its thousands of hospitals, to a National Medical Corporation, is it not worth considering a corporation concerned only with providing personnel? Such an organisation—we may call it, to mark the difference, a Medical Guild—might have as members all doctors outside Government employ. It could be paid by the Government, and by health authorities and other bodies, for services rendered, and would divide its receipts among its members—in salaries, in capitation fees, or in any other way—according to the duties performed. Appointments as medical superintendent, or house-surgeon, or medical officer of health, or works doctor, would be made by the Guild in consultation with the health authority or firm concerned; but the holder of any of these posts would remain professionally free, since the employer paying his salary would be his own profession. A Guild of this kind would naturally be responsible for the discipline of the profession, and should be able to find means of checking abuse of certification. It might also assume control of medical education, and in relation both to training and appointments could work through councils associated with the universities and medical schools of each region. Since it would be handling large sums of public money, and making decisions of considerable importance to the public, the Government and the public might well claim representation on its governing body; but this

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might in fact be healthy, since closed corporations are apt to become narrow-minded.

Professional self-government on some such lines might bring the traditions of the past into the service of the future. It would at least be a challenge to doctors to show that they can collaborate in a big way for the public good.

INFECTED WAR WOUNDS

THIS pause between rounds is an appropriate time to evaluate the experience gained in the treatment of wounds on different fronts at home and abroad and to sift the work of our research teams. Such a survey has been undertaken by a committee of the National Health and Medical Research Council in Australia and one of their reports[1] deals with infected wounds.

Infection may be due to inadequate treatment or the delay inseparable from mobile war. The committee point out that the missile itself is not the usual harbinger of infection—often the organisms are introduced during treatment. The organisms may come from the nose or mouth of the patient or his attendants; from the bedclothes, dust, infected wounds of other patients, the hands and fingers of attendants, instruments. Accordingly they urge that all surgeons should be familiar with what is known of hospital cross-infection, and should digest our Medical Research Council's War Memo No. 6. As a rule the late wound needs gentle debridement; it should be laid open and enlarged, the fascia freely divided, old blood-clot removed, tags of necrotic tissue excised, and any accessible foreign body removed. For this the scissors should be preferred to the knife, and gentleness is essential if the surrounding defensive barrier is not to be breached. Sometimes it will be possible to leave the wound alone—if there is no redness or swelling, no œdema or pain. If pain in the wound persists in spite of complete rest, it is certain that exploration is needed. If the wound is tender or painful and there is much œdema—especially if the œdema is increasing—drainage is needed urgently. Should the infected wound be encased in a closed plaster? The answer cannot be dogmatic. The committee agree that in the fresh war wound the closed plaster method has proved itself. In the infected wound they believe that it is the commoner practice in England for surgeons to withhold plaster until the acute inflammatory reaction has settled down. But many of our surgeons maintain that if drainage is efficient immediate plaster immobilisation carries no risk. Even if pus does pocket, the temperature chart, pain and distal œdema are early definite indications for further drainage. If there is doubt about the local circulation, or if the patient is to be evacuated to a different hospital under the care of a surgeon who does not know the details of the previous operation, then plaster is inadvisable. The plaster, if used, must be adequate—it must extend and include the joints above and below, and for the thigh wound a double hip spica is desirable. The committee recommend vaselined gauze packing but the "packing" should be merely lightly laid on. The plaster should hardly ever be removed in less than a month, and unpleasant smells can be checked by enclosing it in a bag of charcoal cloth. Wound discharge sometimes causes a local dermatitis; it is well then to leave the plaster off for a few days before reapplying it. In the already infected wound the local use of sulphonamides is disappointing, for pus and necrotic material interfere with their action and prevent them diffusing into the deeper barrier tissues. To reach these tissues a sulphonamide must be given by mouth, for the concentration of drug in the living muscle will then be much the same as in the blood. In preparing the granulating surface for skin-grafting, however, local sulphonamides have proved their value. Irrigation of the infected wound, with Dakin's solution, eusol or electrolytic sodium hypochlorite, is useful not so much for its antiseptic action as because it will dissolve necrotic sloughs and stimulate a flow of plasma. For infected wounds of hands and fingers the committee consider that the silk irrigation envelope devised by BUNYAN and STANNARD prevents cross-infection, and the early movements it permits may be an advantage. They approve of powdered proflavine for dusting the infected wound, as described by MITCHELL and BUTTLE[2]; in amounts of 0·25–2 grammes it is effective against most pyogenic organisms, but does not influence proteus. They draw attention also to the value of 1% acetic acid in dealing with *B. pyocyaneus*, which is resistant to other antiseptics and often destroys the newly applied skin-graft. They recount the many advantages of penicillin, with its potency against sulphonamide-resistant organisms and the staphylococcus, and join in the lament that so little is available. No mention is made of the importance of bacteriological control of treatment, which was strongly advocated in the MRC War Memo No. 6 on the prevention of hospital infection of wounds.[3] As soon as the healing wound is relatively sterile, skin-grafting or secondary suture is to be carried out; secondary suture is perhaps not done often enough. Any skin area larger than 3 sq. in. requires a graft; such grafting must not be delayed, for this leads to deep fibrosis, and the resultant anæmic granulations are unable to deal with infection. The scarred base too is a poor recipient for a graft, and such scarring leads to permanent disturbance of function. Under plaster the skin that grows in from the sides is of poor quality, and a skin-graft is to be preferred. In preparing the graft bed they recommend saline baths (2%) followed by sulphonamide dressings, and at night a crêpe bandage to maintain firm pressure. About a week's preparation is usually needed, and razor grafts are much to be preferred to the seedling (Reverdin) type of graft. Attempts to hurry local wound healing by so-called wound stimulants have been abandoned. Sometimes a persistent chronic wound may be due to a deep foreign body. The removal of this is not to be lightly undertaken, and should only be done after careful X-ray localisation. If accessible it may be approached gently through the wound itself; if deeply placed it is probably better and more easily approached from a different direction. Meanwhile the wounded patient's general condition must not be forgotten. He needs extra vitamins and more than the usual allowance of proteins; blood-transfusions are to be given not only for their hæmoglobin but also as a means of restoring rapidly the lowered protein reserves.

1. *Med. J. Aust.* March 6, 1943, Suppl.

2. Mitchell, G. A. G. and Buttle, G. A. H. *Lancet*, 1942, ii, 416.
3. *Ibid*, 1942, ii, 369.

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WORKING HOURS OF YOUNGSTERS

THOSE who have consistently maintained that over-long hours are worked by young people in factories and elsewhere will be relieved to know that the Government has decided to review the position and to lessen the strain imposed on some of them by war-time working comditions. This intention is announced in a White Paper[1] prepared by the Board of Education and the Scottish Education Department, describing the results of interviews with boys and girls between 16 and 18. The object of the interviews, which were carried out by panels appointed by the local education authorities, was to determine how these youngsters' well-being and training for national service could be advanced, and to see how far they could be advised to join pre-service training organisations in the spare time left to them after a day's work. It was found that for various reasons 25–30% of them could not reasonably undertake spare-time activities. In many cases the hours spent in work and travel were so long and inconvenient that the young people had little leisure or energy left. Many girls had to do domestic work at home after a full day's work; others took part-time evening employment as cinema attendants. Most of the interviewing panels report evidence of widespread fatigue and strain among the young people, but they also pay a tribute to their morale and keenness to help in winning the war. Complaints were rarely heard about the hours and conditions of work. "There is," says the report, "abundant testimony to their cheerfulness in shouldering their responsibilities, and many interviewers have referred warmly to the stimulus and encouragement which they themselves have found in meeting them."

The Committee on Wage-earning Children, in an addendum to its 1940 report,[2] paints a gloomier picture. It quotes instances of excessive hours being worked by young people in many parts of the country, and maintains that the Young Persons (Employment) Act, 1938, which controls the hours of errand and van boys, assistant cinema operators and pages in clubs and hotels, is not being administered adequately. It says that long hours are being imposed on children by emergency legislation, and that the Ministry of Labour, using the Defence Regulations, is making orders permitting women and children to be employed for longer hours than are allowed by the Factories Act. From Lincoln "appallingly long hours" of work are reported, ranging from 50 to 60 and even 70 hours weekly, and "it was disturbing to find that the statutory limit was not being exceeded." It is not clear in which occupation 70 hours a week was being worked but in no regulated occupation is a young person allowed to work as long as this. Those not protected by legislation include office workers and girls who are employed in the kitchens, serveries and mess-rooms of industrial canteens. The committee says that although it would be illegal to employ a girl under 18 at night in a factory process, there is nothing to prevent her being employed at night, or for over-long hours, in a factory canteen. On the other hand, the White Paper finds no evidence that young persons in general are working hours in excess of those permitted by the existing regulations; but when the hours allowed as set forth in its appendix are examined, it is not surprising that evidence of widespread fatigue among youngsters has been found. Take the Factories Act, for instance. The basic weekly hours of work for young persons over 16 not working overtime are 48, a figure which does not include meal-time breaks or rest pauses, and it is legally possible for the young persons to spend as much as 11 hours a day in the factory. They may also work overtime for 6 hours a week and 100 hours in the year spread over not more than 25 weeks. While doing overtime they are allowed to remain in the factory for as much as 12 hours a day. Further relaxation of hours is allowed under the Defence Regulations, and the Committee on Wage-earning Children points out that there are two kinds of orders making longer hours possible: 'general' emergency orders which apply to certain classes of factories, and special emergency orders which apply to individual factories. None of the special emergency orders and few of the general orders are on sale, but as a result of protests in Parliament the general orders are now available in the libraries there. The committee is inquiring how far the special orders issued privately to individual factories allow hours of work in excess of those permitted by the general orders.

The time worked by young people under 16 is a different problem; these children should certainly not work more than 40 hours a week, but 44–48 hours (with no overtime) are at present allowed in most of the regulated occupations. It is refreshing therefore to learn from the White Paper that the Government proposes to review immediately all cases of war-time relaxations of hours of employment with the object of providing that young persons of 16 and 17 shall not be employed for more than 48 hours in any week "except where the hours were necessitated by the particular circumstances," and similarly that young persons of 14 and 15 shall not be employed for more than 44 hours a week; let us hope that in this case 40 will be substituted for 44. It is intended to arrange wherever possible for the transfer of young people from employment which necessitates travelling for more than an hour each way to employment nearer home; to develop the existing policy of staggering hours of employment; to review the arrangements for the feeding of young people in industrial and business canteens; and to make it clear to local education authorities and interviewing panels that young people should not be encouraged to take part in extra activities which encroach on their periods of rest and sleep. The question of double employment will also be reviewed with a view to strengthening the existing law. With the *Times*, we hope that the measures proposed to remedy the situation will be prompt and effective.

1. Youth Registration in 1942. Cmd. 6446. HMSO. 1943. Pp. 26. 6*d*.
2. Industrial Protection of Youth, 1940. Issued by the Committee on Wage-earning Children, 296, Vauxhall Bridge Road, S.W.1. With an addendum dated 1943. 3*d*.

"The results reported are essentially negative. . . . Publication of our findings seems, nevertheless, desirable; a man seeking to reach the centre of a maze may help others who follow after if he erects warning notices at the entrance to paths which he has found it unprofitable to pursue."—C. H. Andrewes, H. King and M. Van den Ende, *J. Path. Bact.* May, 1943, p. 178.

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Annotations

SAFE MILK AND THE PUBLIC

THE Ministry of Food officials do not yet seem to be health minded as regards milk. To them all milk is just milk, without regard to quality; they are concerned merely with quantity and often fail to appreciate that a large section of the public want and are willing to pay for a safer milk-supply. Pending the introduction of some measure of compulsory pasteurisation, which is long overdue, the least the Ministry of Food can do is to allow parents to buy pasteurised or tuberculin-tested milk if they are in a position to obtain it. Under existing arrangements consumers are not allowed to do so. The following is an illustration of the action adopted. A doctor in a northern city wishes to obtain TT milk for his 8 months baby just weaned, but his registered supplier cannot furnish it. The local food office refuses to allow a change of milk retailer for the purpose of obtaining TT milk. The only circumstance considered to be justifiable reason for change is a medical certificate of illness of the baby. Presumably the proper course, in the view of the Food Office, is for the baby to take the ordinary milk until it is infected by it, when a medical certificate saying so will obtain a better supply. In this case the position is aggravated by the fact that there is no difficulty in obtaining TT milk locally, and provisional arrangements were made, only requiring permission from the food office. What then is the object of the Ministry of Health in allowing producers to produce TT milk? Surely it is not merely to enable such producers to obtain a higher price per gallon and then encourage them to mix it with the ordinary milk-supply, much of it dirty and liable to contain the bacteria of tuberculosis and other diseases. We must suppose it is to enable this better quality milk to be supplied to consumers who appreciate that a safer milk-supply is worth paying for. If so, it is time the Ministry of Health took steps to convert the Ministry of Food to its view that milk has an infective as well as a nutritive side.

SODIUM SULPHONAMIDES BY MOUTH

IN many severe infections, such as cerebrospinal fever or pneumonia, success depends on getting a sulphonamide compound into the blood-stream as quickly as possible. In such cases the common practice had been to give an intravenous (or less satisfactory, intramuscular) injection of the sodium salt, but Loughlin and others [1] suggest that the same result can be achieved almost as quickly and much more easily by giving the sodium salts by mouth. They administered 4 g. of these compounds to convalescent patients on an empty stomach and measured the blood concentration every five minutes for the first half hour and then half-hourly up to three hours. Sodium sulphapyridine could usually be detected in the blood within five minutes, and in half an hour the blood concentration (2–6 mg. per 100 c.cm.) was almost as high as it ever became later. With ordinary sulphapyridine absorption was slower, and with sulphapyridine plus an equal amount of sodium bicarbonate it was intermediate. When sodium sulphathiazole was given the levels reached were irregular, as is usual with this compound, but the blood concentration after 25 minutes (1–7 mg. per 100 c.cm.) was practically as high as it ever became later. With plain sulphathiazole the blood concentration rose gradually for more than three hours; with sulphathiazole plus sodium bicarbonate the maximum level (average 5 mg. per 100 c.cm.) was almost reached after an hour. With sulphadiazine the results were similar. With all the three compounds absorption was most rapid with the sodium salt, less rapid with the sulphonamide plus sodium bicarbonate, and slowest and lowest with the plain sulphonamide. Before these results are accepted, a recent report by the American Medical Association Council on Pharmacy and Chemistry [2] should be considered. After reviewing the claims of manufacturing firms that the sodium salts of sulphonamides should be adopted for oral use, the council concludes that there is no evidence that these salts are more effective therapeutically than the parent compounds; the salts are converted into the parent substances by the acid of the stomach, and the form which reaches the blood will be the same in both cases. As regards absorption, if sodium sulphathiazole and sodium sulphadiazine are given on an empty stomach or by duodenal tube, they are absorbed more rapidly and more completely than the parent substances, but not if they are administered after a meal; and it is doubtful, in the council's view, whether the difference is great enough for oral administration to be a satisfactory substitute for injection. There is no evidence, they say, that when given by mouth the sodium salts are better (or as well) tolerated as the parent substances. Accordingly the council, while being prepared to reconsider the subject when more evidence is available, recommends that sodium sulphathiazole (and by implication, the sodium salts of other sulphonamides) should not be given by mouth at present and that, when it is necessary to bring the blood levels up to the optimal figures immediately, the parenteral use of the sodium salts should be preferred.

1. Loughlin, E. H., Bennett, R. H., Flanagan, M. E. and Spitz, S. H. *Amer. J. med. Sci.* 1943, **205**, 223.

O. W. HOLMES AND PUERPERAL FEVER

IT is a hundred years since Oliver Wendell Holmes read his paper to the Boston Society for Medical Improvement on the contagiousness of puerperal fever and started a fierce controversy which prepared the ground for the general acceptance of the views, put forward by Charles White [3] of Manchester seventy years before and by Semmelweis between 1847 and 1858. Daily [4] quotes these passages from Holmes's paper, which summarised evidence pieced together from reports published in Europe and America and from his own observations in Massachusetts.

". . . The disease known as puerperal fever is so far contagious as to be frequently carried from patient to patient by physicians and nurses. . . . it would seem incredible that any should be found too prejudiced or indolent to accept the solemn truth knelled into their ears by the funeral bells from both sides of the ocean—the plain conclusion that the physician and the disease entered, hand in hand, into the chamber of the unsuspecting patient. . . . This long catalogue of melancholy histories assumes a still darker aspect when we remember how kindly nature deals with the parturient female, when she is not immersed in the virulent atmosphere of an impure lying-in hospital, or poisoned in her chamber by the unsuspected breath of contagion."

Fifty years later, in a letter to a friend, Holmes thus assessed the part he had played in getting the truth accepted.

". . . I do know that others had cried out with all their might against the terrible evil before I did, and I gave them full credit for it. But I think I shrieked my warning louder and longer than any of them and I am pleased to remember that I took my ground on the existing evidence before the little army of microbes was marched up to support my position."

The existence of this "little army" was hinted at by Lister in 1867 and finally disclosed by Pasteur in 1879. The Sloan Hospital report in 1927 carried wide conviction, for here a complete bacteriological investigation of an outbreak of hæmolytic streptococcal infection showed that the only place where the streptococci were found was in the nose and throat of certain doctors, nurses and members of the domestic staff. In 1935 Lancefield and Hare demonstrated that hæmolytic streptococci can be divided into eleven well-defined groups by serological tests. This classification much

2. *J. Amer. med. Ass.* 1943, **121**, 1008.
3. See Burgess, A. H. *Lancet*, 1941, i, 235.
4. Daily, E. F. *J. Amer. med. Ass.* 1943, **121**, 1006.

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facilitated the task of tracing a streptococcal epidemic to its source, and led to the work of Leonard Colebrook and his colleagues on droplet infection which proved finally how correct Holmes had been.

DEVELOPMENT OF INDUSTRIAL MEDICINE

THE English habit is to begin in rather a small way. In this country the would-be poultry-farmer does not start by ordering 10,000 productive fowls: he is content to find a genuinely broody hen and set her to hatch a dozen fertile eggs. And oddly enough this method often pays in the end.

These irreverent comparisons come to mind on hearing of the Medical Research Council's new venture into industrial medicine: as we announced last week, they have appointed Dr. Donald Hunter part-time director of a new department of research in industrial medicine established at the London Hospital, with Dr. Kenneth Perry and Dr. Norman Spoor as his full-time assistants. Viewed in relation to the scope of industrial medicine today, or in relation to the scores of large institutes devoted to the subject in the USSR, the project is not ambitious. Nevertheless, it is well conceived and important. Dr. Hunter, as physician to the London, has for fifteen years made special studies of industrial poisoning—a form of inquiry for which his hospital is well situated, since in the area between the River Lea and the mouth of the Thames, almost every chemical substance used in industry is either manufactured or handled. His choice as director is justified not only by his works but by his faith: he has been an inspiring teacher of industrial medicine and toxicology, and his new position will give him larger opportunities to be a moving spirit in their development both in London and elsewhere. His department is intended primarily for the kind of long-term research that cannot be undertaken by the factory department of the Ministry of Labour, and these will mostly be carried out at the London Hospital itself, where the aid of pathologists, bacteriologists, radiologists and other specialists is at hand. But Dr. Hunter and his staff will also visit other parts of the country where special problems are brought to their notice, and they will hold courses of instruction open to all members of the profession.

RELIABLE BLOOD-GROUPING

WITH our present knowledge, errors in blood-grouping are indefensible. The Medical Research Council by summarising this knowledge so far as the ABO groups are concerned, drawing up recommendations and publishing them in a War Memorandum,[1] costing fourpence, is helping to ensure that everyone shall get the best results. But one of their conclusions is that blood-grouping, to be accurate, is not to be lightly undertaken by anyone who does it only occasionally; it is essentially a job for trained assistants. This memo is intended as a guide for those setting up blood-transfusion or grouping centres and as an aid to uniformity of technique among existing centres. For actual grouping the "tube method" is recommended as first choice. This is more or less the method described by G. L. Taylor and his co-workers.[2] It is certainly accurate, but presents difficulties in present circumstances—it requires a lot of glassware and is not rapid; these are serious objections in big centres. A "tile method" is therefore described as second choice; the technique is carefully defined, and if this is followed closely the results should be almost as reliable as with the tube method, except perhaps in rare cases of difficulty with the sub-groups of A. The memo emphasises that diluted blood—blood taken into freshly-made 1% sodium citrate in normal saline—must be used and deprecates the habit of using a loopful of blood taken directly from finger or ear. With both methods, to minimise mistakes, testing of unknown cells against known sera, and of unknown serum against known cells, is advised. When a transfusion is to be given, normal blood-grouping tests of donor and recipient should be carried out whenever possible, and direct matching of donor's cells against recipient's serum should always be carried out. Only the most acute emergency justifies the omission of direct matching, and group O blood must be used; even then a plasma or serum transfusion can usually be started first to give the necessary time. Other subjects treated in the memo are the preparation and storage of test sera, sources of error in blood-grouping and the way to tackle them, and the Rh factor. Some space is given to the subdivisions of group A and the snags arising from abnormal agglutinins such as non-specific cold agglutinins. Anyone unfamiliar with the subject might get a disproportionate view of the importance of these points, because they cannot be explained in a few lines, but in practice if the techniques detailed in the memo are followed they will seldom be met with.

1. Determination of Blood Groups. MRC War Memo, No. 9, 1943. Pp. 19. HM Stationery Office. 4d.
2. See *Lancet*, 1942, 1, 509.

PRICKLY HEAT

THOUGH it is a bugbear of the tropics, prickly heat is usually looked upon as no more than just another of those constant but trivial nuisances which jangle the temper. That it may be more serious is brought out by Blomfield,[1] who has obtained his experience at Assab in Eritrea, where the intense heat is fortified by high humidity. Here he has met cases so severe that the efficiency of Army units has been materially affected, and in which transfer to a cool climate has been necessary. The ætiology of prickly heat has long been debated, but the fundamental condition is recognised to be excessive sweating, and it is on this assumption that the author bases his convincing argument. He describes two main types: the miliaria rash, in the parts of the skin which contain small sweat-glands; and the pemphigoid condition, characterised by large bullæ, in the axillæ and groins where the large-coil sweat-glands occur. In each case there is glandular dysfunction due to excessive activity, with blockage of the ducts, congestion and retained secretions; but where the glands are of the large type, the damming of secretions leads to formation of bullæ. Bacterial infection superimposed on these conditions leads to formation of boils or ulcers, and fungus infections of the ruptured bullæ give characteristic sores with black centres. Blomfield does not agree with the view that fungus infection is an essential factor in the causation of prickly heat. The pain occasioned by such sores may well be imagined. There may be a dietetic deficiency factor in the ætiology, but this has not been proved. Treatment is not dramatically successful, and apparently depends more upon scrupulous cleanliness, the avoidance of sweating, and the continuous wiping away of sweat as it forms, than upon external applications.

TASTE IN VEGETABLES

"How shall a six-year-old be gently persuaded into a taste for greens?" asks Le Gros Clark,[2] for he has observed that in the Hertfordshire county council canteens 25–30% of children turn up their noses at the cabbage tribe. Many adults do so too, and are better placed to pander to their taste by banishing greens from their table. Others take a firmer line with their palates and eat greens because they are good for them; some lucky ones as really like greens and consume them gladly at every opportunity, even with cold meat. Prof. J. C. Drummond, in a foreword to Le Gros Clark's report, repeats the old statement that we grow the best vegetables in the world and ruin them by bad cooking.

1. Blomfield, D. M. *Trans. R. Soc. trop. Med. Hyg.* 1943, 36, 239.
2. The School Child's Taste in Vegetables. By F. Le Gros Clark, B.A. Herts County Council Education Department, County Hall, Hertford. Pp. 14. 3d.

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Mr. J. H. Newson, education officer for Herts, in his introduction quotes the French proverb: "Point de légumes, point de cuisinière," and clearly leans in the same direction. A peripatetic correspondent, too, has found a new delight in vegetables when they are served direct from the pan to his plate. Le Gros Clark's figure may be on the depressing side, for it is difficult to cook and serve vegetables as appetisingly on a large scale as in the home. Quick cooking with a minimum of water and minimal delay between pan and plate seem to be the main aims. Elaborate culinary methods are likely to reduce still further the vitamin-C content and frustrate the main object of eating greens in war-time. Attempts to conserve the vitamin C by "serial cooking"—by boiling the greens in the water saved from previous boilings—are likely also to conserve the queer flavour of the brassica's sulphur compounds. Casserole cooking destroys the green pigment and makes the greens look unappetising. But there is no reason to despair of getting children to eat greens provided we start early enough. Ideally they should begin as soon as they start solid foods—say about the sixth month—and sieved greens are in fact now widely given by the well-to-do mother as part of the weaning diet. The elementary-school child is another proposition. His mother has had neither the knowledge nor the time to establish a conditioned reflex for greens in him, and by the time he gets to the school-feeding centre an opposite reflex may have taken root. Moreover, there are foolish adults about who will confirm the child in his natural distrust of a new food. The solution must be to educate the child's tastes early, in the home or the nursery school, and impress both mothers and nursery-school caterers that it is worth while to learn to cook greens and serve them attractively.

A MISSION TO RUSSIA

AN Anglo-American surgical mission is going to the Soviet Union, to study especially the Russian methods of treating war wounds. The Services are represented by Colonel Elliott C. Cutler and Colonel Loyal Davis (US Army), Surgeon Rear-Admiral G. Gordon-Taylor (Royal Navy), Major-General D. C. Monro (British Army), Mr. R. W. Watson-Jones (orthopædic consultant to the RAF), and Mr. E. Rock Carling (civil defence); while Prof. Wilder Penfield, FRS, and Mr. Carling represent respectively the National Research Council of Canada and the Medical Research Council. The subject of inquiry, though restricted, may be interpreted to cover many topics on which recent Russian experience will be of value to us; and we hope that the profit will not be all on one side. Moreover, such a visit gives a chance to establish friendly professional relations that should bear fruit later in discussions on other matters.

By way of wishing the mission godspeed, the Royal College of Surgeons, as we report on p. 727, has admitted Colonel Cutler and Professor Penfield to its honorary fellowship, and has charged Admiral Gordon-Taylor, who is its senior vice-president, to confer the same distinction on two Russian surgeons, Dr. Yudin and Dr. Burdenko. Dr. Yudin's name has been familiar outside Soviet Russia at least since 1933 when he published in Paris his book on the transfusion of cadaver blood. He analysed his first 1000 cases of this kind in our own columns in 1937, and his relatively early work did much to revive interest in the use of stored blood for transfusion. Dr. Burdenko, besides directing the institute of operative surgery of Moscow University, is the president of the Scientific Medical Council of the USSR, which is an important element in the medical life of the Union. He is now surgeon-in-chief to the Red Army. Prof. Penfield, director of the Institute of Neurology at Montreal, which he built and developed, is an outstanding exponent of the surgery which establishes effective symbiosis with physiology. Lastly Colonel Cutler, who proved his friendship for Britain by joining our Army in 1916, has in the past year or so done a great deal to promote similar friendship between the medical services of this country and the USA. There are now many outside his own country who recognise his quality as a pioneer of surgery, a teacher and a leader.

The association of British and American surgeons in a visit to the USSR is a happy event. We wish it the success that will promote other missions of the same kind in various directions.

IS YOUR EQUIPMENT INSURED?

A LEAFLET from the Board of Trade reminds doctors, among others, that unless they insure their equipment under the Business Scheme provided for in Part II of the War Damage Act, they will not receive any compensation if their equipment is damaged or destroyed by enemy action. "Equipment" includes for this purpose the doctor's apparatus, professional books, furniture in the consulting-rooms, and in the case of a doctor who runs his own dispensary, his stock of drugs and other medicaments. These are all insurable under the Business Scheme and will be covered by any policy which a doctor takes out under that scheme for not less than their value for the time being. It is compulsory for a doctor to insure under the Business Scheme if his equipment is worth more than £1000. If his equipment is worth £1000 or less, insurance is voluntary, but he will get no compensation if he does not insure. Insurance, which must cover all the equipment, can be effected through any of the principal fire insurance companies or Lloyd's brokers. The rate of premium for the period April 1 to Sept. 30, 1943, is 5*s*. per £100. In deciding for what sum to insure, doctors should estimate the current cost of replacement of the articles, less an allowance for depreciation corresponding to the actual condition of the articles at the time. Payment of claims under the Business Scheme assessed at £100 or less is made as soon as the assessment is completed. Payment of claims assessed at more than £100 will, in general, be deferred, in accordance with the War Damage Act, until after the war, interest being payable at 2½%, unless the doctor is able to satisfy the Board that the replacement or repair of his equipment is in the public interest.

SUPRARENAL MEDICATION

IN March the Medical Research Council issued a statement by their Therapeutic Requirements Committee drawing attention to the need for strict economy in desoxycorticosterone acetate and urging doctors not to prescribe it for any patients except those suffering from Addison's disease (*Lancet*, April 3, p. 438). Since then further information regarding the stocks of desoxycorticosterone acetate held by individual firms has become available to the Therapeutic Requirements Committee, and it now appears that the need for conserving supplies in the interests of patients suffering from Addison's disease is not so pressing as was thought. Some of the difficulties experienced in obtaining supplies appear to be due to patent rights and the use of branded names, and it has been suggested that the drug should always be prescribed as desoxycorticosterone acetate. The committee repeat that there is no evidence that this drug is essential for any purpose except the maintenance treatment of Addison's disease, and they therefore propose to continue the classification "B" for it. Natural extracts of suprarenal cortex are indispensable in the treatment of Addison's disease, particularly in the acuter phases, and they probably have a wider field of usefulness than desoxycorticosterone acetate. Adequate supplies of natural extracts of suprarenal cortex are available from glands collected in this country, and the committee therefore propose to continue to classify them "A." Doctors who have difficulty in obtaining any of these drugs should communicate with the Director of Medical Supplies, Ministry of Supply, Portland House, Tothill Street, S.W.1.

EPSOM COLLEGE.—The ninetieth annual general meeting of the Royal Medical Foundation will be held at 49, Bedford Square, London, W.C.1, on Friday, June 18, at 4 PM.

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Special Articles

NUTRITION IN INFANCY

THE Nutrition Society held an all-day conference on May 22 at the London School of Hygiene and Tropical Medicine, with Prof. L. G. PARSONS in the chair. In the morning the papers dealt with the scientific aspects of infant nutrition and in the afternoon with its administrative aspects. Dr. HELEN MACKAY discussed what is known of the infant requirements for specific nutrients and the figures issued by the American Committee on Food and Nutrition. Breast milk is superior to cow's milk because of its greater ease of digestion and less risk of infection. The casein of cow's milk is less valuable than the lactalbumin of human milk, and this is important when it is remembered that the baby gets all its protein from milk in the early stages, though it may get fat and carbohydrate from other sources. The infant's store of iron lies in its liver and red cells, and postnatal utilisation of this store is necessary because of the low iron content of milk. The fact that the hæmoglobin level of many babies is below normal at the end of the first year suggests that they are not receiving enough iron. The administration of soya bean flour has prevented this anæmia developing in most babies but not in all, perhaps because of the presence of phytic acid in the soya bean. Minimum calcium requirements are difficult to assess because of the variation in individual needs. It is possible that the full-term baby can call on reserves of calcium in the trabeculæ at the heads of long bones, but that this source of calcium is not available to the same extent for premature infants. Little is known of the exact vitamin requirements of infants, but a routine dose of vitamin D should be given under all circumstances. Babies which are taken outdoors regularly never develop rickets; premature babies need vitamin D particularly early in their lives. Roller-dried milk may contain as much as 1000 IU of vitamin D per reconstituted pint, which is about as much as the infant requires daily. Information concerning the amount of vitamin-B complex needed is scanty. The American committee suggests 30 mg. of vitamin C (the amount contained in about 2 oz. of orange juice) a day as a satisfactory dose for babies; this is probably more than is necessary. An adequate fluid intake is important because a young baby suffers quickly from lack of water. A breast-fed baby obtains 2½ oz. of fluid daily per lb. bodyweight. Babies are often not given enough food, and symptoms of hunger sometimes go unrecognised. Whether the baby is getting enough of the right food often depends on the digestibility of the food.

Prof. NOAH MORRIS agreed that the problem of the optimum intake is beset with innumerable difficulties. The requirement of vitamin D varies with rate of growth, the immediate previous history (e.g., whether there has been any exposure to ultraviolet light), and the amount of calcium and phosphorus in the diet. It is not possible to protect all children completely, for some children develop rickets despite large doses of vitamin D. In the first six months, when bone formation is very active, it is most important to give adequate vitamin D; in fact, as much of this vitamin is needed during the first six months as later. Professor Morris believed that there is little difference between vitamin D_2 and vitamin D_3; 400–700 IU per day of vitamin D is probably a good average figure for the normal infant's requirement. This amount should be given as early in life as possible and all the year round; no allowance should be made for seasonal variations. References to the danger of hypervitaminosis D should come out of the literature. This was supported by Prof. H. P. HIMSWORTH, who claimed to have given ½–1½ million IU a day of vitamin D to a case of hyperthyroidism without undesirable signs.

Mr. S. K. KON, PhD, of the National Institute for Research in Dairying, gave these figures for the vitamin value per pint of human milk (approximate average of 1000 samples): vitamin A, 700–850 IU; vitamin C, 12 mg. in winter and 24 mg. in summer; vitamin B_1, 0·07 mg.; riboflavin, 0·13 mg.

Wing-Commander R. W. B. ELLIS, speaking on the recognition of nutritional disorders, pointed out that under-nutrition plays a part in most infant complaints, and discussed the signs and symptoms of the chief nutritional diseases. One of the important factors in imperfect nutrition of babies is simple underfeeding. There are three ways of detecting this:

1. The behaviour of the baby. A hungry fretful baby is an underfed baby. The sleep rhythms of both baby and parents are disturbed. Sometimes there is vomiting because the hungry baby will gobble its food, and if the food is then diluted the condition will simply be aggravated.
2. The weight chart. This is useful but it must be intelligently used. The average child should gain about 4 oz. per week during the first year and in the second year only about half this amount. But a fat, inactive baby may actually lose weight at the beginning of the second year when it starts to walk. Daily weighing in the home is liable to spread "alarm and despondency." Weekly weighing is sufficient in the first year and monthly weighing in the second year.
3. Test feeding—that is, weighing before and after a feed. Since the amount of food that an infant takes at any one meal is likely to vary considerably, test feeding should be continued over a period of 24 hours to obtain a reliable estimate of the baby's food intake. The fat content of the mother's milk varies at different times in the day, so a single estimation is valueless; it, too, should be an average of samples taken over 24 hours. In calculating the amount of food that bottle-fed babies are getting, allowance should be made for variation in the size of the measuring spoon used and for the fact that many mothers gauge the amount by eye.

Rickets and scurvy may be diagnosed in children by clinical, radiological or biochemical investigation. It is now generally taught that fœtal rickets only occurs with severe maternal osteomalacia, but Dr. Ellis has seen one case which showed the characters of fœtal rickets while the mother was normal. Rickets is more likely to develop in premature than in full-term babies. If an infant has an infection and is kept indoors for some time, it may develop rickets. Degree of muscle tone, as indicated, for example, by lifting the head, may give an indication of the disease. Enlargement of the costochondral junctions (beading) is one of the earliest signs of rickets and can easily be felt in thin children. The rate of closing of the fontanelle is also helpful; it should be impalpable after 18 months, and if it remains open after that time rickets should be suspected. While a deformed thorax may be due to vitamin-D deficiency, it may also be caused by respiratory infection. Frontal bossing is only seen in well-marked cases of rickets, but enlargement of the epiphyses is important in clinical diagnosis. It is very difficult to get a good X-ray picture of enlargement of the costochondral junctions, but cupping of the radius and ulna, and the irregular and feathery growth line of these bones in rickets, make a satisfactory radiological diagnostic sign of the disease. From a biochemical point of view the most practical diagnostic method in rickets is an estimation of plasma phosphatase. Acute scurvy in infants is not necessarily associated with neglect; Dr. Ellis knows of one case due to scalding of the child's orange juice by the mother. Since acute scurvy takes some time to develop, the most likely time to find it is after 8 months of age, and it occurs usually in infants who have been fed solely on boiled or pasteurised milk. One of the earliest signs of scurvy is tenderness of the limbs, which may become so bad that the infant screams when moved. There may be red cells in the urine and some anæmia. Scorbutic beading of the ribs differs from rachitic beading in showing a sharp line of demarcation between bone and cartilage. One of the earliest radiological changes is in the tibia. The cortex becomes thinned and in some cases the corner of the tibia appears to be torn away. There is also displacement of the epiphysis, which has a signet-ring appearance. Subperiosteal hæmorrhages may occur.

Dr. STANLEY GRAHAM pointed out that infection in infants is likely to cause nutritional deficiency, and nutritional deficiency is likely to lead to infection. Furthermore, a latent scurvy may be made active by infection.

Dr. A. A. MONCRIEFF discussed the treatment of nutritional disorders. He believed the classical symptoms of underfeeding—sleeplessness, crying and so on—are not obvious in a slowly starved child. There is an intimate relation between infection and nutrition, so

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much so that babies which are suffering from an infection are often labelled "marasmus." True marasmus, in which the tissue cells just seem unable to absorb enough nourishment, does occur, but the name should be used with more discretion. When faced with the vicious circle of infection and malnutrition, it is best to treat the infection first. In the treatment of unequivocal dietary diseases, such as rickets, scurvy and anæmia, the appropriate specific should be given in as large amounts as possible. Rickets responds well to 2000–3000 IU of vitamin D a day, an amount which is contained in 5–8 teaspoons of cod-liver oil. Preparations such as cod-liver oil and malt, which rarely contain more than 10% of cod-liver oil, cannot be regarded as either a prophylactic iagainst or a cure for rickets. Dr. Moncrieff agreed with previous speakers on the unreality of the dangers of hypervitaminosis D and quoted a case of his own which was unaffected by 500,000 IU of the vitamin daily for 6 weeks. Ultraviolet light is useful in preventing rickets but is not much use in curing it. In the treatment of scurvy it does not matter whether the natural or synthetic ascorbic acid is used; a good average daily dose for treatment is 200–300 mg. It should be remembered that anæmia is sometimes the result of infection and that it will not clear up while infection persists.

Dr. J. V. C. BRAITHWAITE said that nutritional disorder may be caused by loss of tolerance to food, infection, heat or to a constitutional difficulty in taking certain foods.

ADMINISTRATIVE ASPECTS

Prof. J. C. SPENCE said that the aim of administration should be to provide the best working conditions for technical workers in child nutrition. There should be separate departments for maternal and for child welfare. There should also be a better mechanism for giving technical advice to mothers, and here the organisations of the Board of Education and the Ministry of Food should play a part. There are many difficulties in the encouragement of breast-feeding. Male doctors and nurses seem unable to get the subject over to the mother. One of the reasons for the decline in breast-feeding is that it is being made too mechanised, with test feeding and the like. Professor Spence was perturbed about the influence of advertisements of patent baby foods on mothers, leading them to spend more money on these foods than they can afford; some control should be exercised over such advertisements. Housing is an important factor in infant nutrition, because good food needs proper storage and in many houses this is not possible.

Dr. H. E. MAGEE, of the Ministry of Health, maintained that clothing may interfere with infant nutrition. Some children wear such huge amounts of clothes as to interfere with heat dissipation and therefore with nutrition. One must begin with the diet of the mother before conception to obtain the best results with the child; the importance of this was shown by the Toronto and London experiments. Breast-feeding is undoubtedly an important factor in infant nutrition. The milk and vitamin schemes now in force in this country are probably the most valuable public health measures ever taken. Milk supplements given to children in 1936 had less effect than those given in 1926 because of the improvement which had taken place in the national diet in those ten years. These improvements in diet, and the nutritional theories on which they were to some extent based, have been thoroughly tested during the present war and have come out with flying colours. There is still room for a decrease in our infant mortality; the rate is lower in better-fed countries and is also lower in children of the professional classes than in those of unskilled workers.

Mr. F. LE GROS CLARK, secretary of the Children's Nutrition Council, claimed that the milk and vitamin schemes are an important precedent. Here for the first time foods are being provided according to biological requirements and not according to capacity to pay. These schemes should not stop after the war, but they are handled now by the Ministry of Food, which will presumably not continue when the war is over. Of the people entitled to them, 90% are taking advantage of the cheap milk scheme and 30% of the fruit juices scheme, but the numbers are progressively increasing.

MEDICINE AND THE LAW

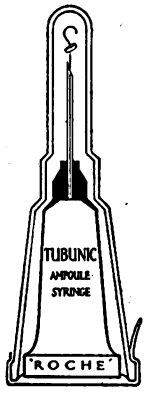
Medical Certificates as Evidence

THE Court of Appeal, having lately to consider the adjournment of a case where one of the parties was too ill to attend, discussed the evidential value of a doctor's certificate. The dispute arose from a verbal arrangement between the parties; there was no documentary material. The defendant's testimony was thus most important. The hearing in the county court, delayed by several adjournments as not uncommonly happens under wartime conditions, was finally fixed for the 9th of last December. On the 3rd the defendant's medical attendant certified him too ill for work; his solicitors sent the certificate to the plaintiff's solicitors and asked for yet another postponement; it was refused. On Dec. 6 the doctor certified that the patient would not be able to leave home for two weeks. At the hearing on the 9th the defendant's counsel submitted the two certificates to the court and asked for an adjournment; he offered that the defendant should pay the resultant costs. The judge refused the application and gave judgment for the plaintiff. On appeal two judges held that the decision of the county court judge was the determination of a point of law, which meant that the appellate tribunal had jurisdiction to review it. The third judge thought that it was a question of fact, which meant that the defendant had no right of appeal. The defendant's appeal was allowed. The judges forming the majority thought that, if an important witness is prevented by illness from attending a court where his evidence is directly and seriously material, the court should allow an adjournment either upon terms or otherwise. If the sick man were one of the parties, the case would be all the stronger. If satisfied of the medical fact of illness and of the material nature of the patient's evidence, the court should not refuse an adjournment unless convinced that the other side would suffer an injustice which could not be reduced by the award of costs.

As for the admissibility of the medical certificate as evidence, the defendant's counsel had offered in the county court to back it up with an affidavit from the doctor. The county court judge apparently refused the adjournment because an affidavit was necessary to prove the illness and no affidavit had been forthcoming. He may have overlooked section 1 (5) of the Evidence Act which Lord Maugham induced Parliament to pass in 1938. This provision declares that, for the purpose of deciding whether or not a statement is admissible in evidence, the court may draw any reasonable inference from the form or contents of the document in which the statement is contained or from any other circumstances,

"and may, in deciding whether or not a person is fit to attend as a witness, act on a certificate purporting to be the certificate of a registered medical practitioner. . . ."

In the Court of Appeal Lord Justice Scott ruled that this enactment was ample justification for the omission of the defendant's solicitors to go to the expense of an affidavit. Medical men will note the decision with satisfaction. They have enough trouble over the signing of certificates without being obliged to reinforce them with a formal affidavit which, except in very special circumstances, will add nothing to the facts already certified.



NEW AMPOULE SYRINGE

A SAFETY model of the Roche Products 'Tubunic' ampoule syringe has been evolved as a result of experience in the Fighting and Civil Defence Services and the Merchant Navy. The glass cover of the hypodermic needle has been replaced by a transparent plastic case with a basal cap which wholly encloses the collapsible metal tube and the needle, so that the entire apparatus is protected and kept unsoiled. The cap and case can be removed in a moment, and the method of use is then the same as with the previous model.

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In England Now

A Running Commentary by Peripatetic Correspondents

I HAVEN'T got a folder for "Fate, irony of" in my file of case-notes; if I had this might go in it. Many years ago, in the very early hours, the telephone roused me from a deep sleep and I heard the familiar voice of Dr. G, saying, "I want you to come at once, please, to No. 4, Blank Street, to see an urgent case. I am there now and will wait for you." Dressing hurriedly, and realising that it would be as quick to walk there—it was quite near—as to get the chauffeur and the car, I was soon on the way. It was a glorious summer morning, and as I turned into the long straight road, out of which Blank Street, a rather mean side-street goes, I saw Dr. G in the distance awaiting me at the corner of it. He also saw me, and walked along to meet me. He apologised for getting me out at this early hour, adding, "It is to see the Hon. Sir A B." Considering the venue of the consultation, I thought he must be joking; he was rather fond of that kind of thing. However, he had quickly read my thoughts and hastily added, "No, I am not jesting this time, it really is the Hon. Sir A B, and moreover he is the mayor of X" (mentioning the name of the capital city of one of our more important colonies). "I have come out to meet you because there is no room, in the wretched little house we are going to, to tell you the history of this tragic business." So as we walked slowly along he gave me this history.

Sir A B, now about 70, and a native of this town, left England as a young man to seek his fortune in the colonies. Exactly how he had started or what had been his particular work Dr. G did not know, but whatever it was he had been successful. Not only had he made and kept a large fortune, but, as from his early days he had taken an active part in local affairs, he had eventually risen to be mayor of his city. As such he had received the honour of knighthood on the occasion of some Royal visit to the colony. During all these years he had never been back to his home-country until this summer, when he had been sent to represent the colony at some celebrations in London. He had arrived a few weeks before, and with his wife was lodged in a luxurious suite at what was then the most expensive hotel in London. The official festivities being over, he determined to carry out a plan which he had often contemplated during his long absence abroad—to spend at least one night in his native town, and visit the scenes of his childhood. He had kept more or less in touch with one of his early friends, and since his arrival in England had arranged to come and stay a night with them at their small house, No. 4, Blank Street. "That brings us up to yesterday," continued Dr. G, "when he left London without telling anybody where he was going, but merely saying he would be away for the night. He got here in the afternoon, and spent the evening quietly at his friend's house. They sat up late talking about old times. There was no question of any revelry or alcohol. About 2 AM they went to bed, and the lights were turned out. When Sir A B began to get undressed, he found he had left the wallet containing his money and important papers in his overcoat hanging up in the hall down stairs, and started to fetch it. The staircase was a small and rather twisting one. The lights, as has been said, were all out. He groped his way to the top of the stairs, missed his footing and fell head first to the bottom. His friends heard the crash, but it was not followed by any cry. They came out to see what had happened and found him all of a heap at the bottom of the stairs. He was alive but could not speak above a whisper or move at all. He had broken his neck."

We had now reached the little front gate and went in. Some of the things from the sitting-room were outside the door and others filled the entrance. They had been moved to make room for the patient who was laid flat on the floor and stretched almost right across it, for he was a tall man. He was in the clothes which he had travelled in the day before. All sensation and movement were lost below the shoulders. He could rotate the head very slightly and speak in a whisper. The days of spinal X rays had not yet come, and there was literally nothing to be done. He died in 24 hours after his fall. Thus after nearly half a century spent thousands of miles away, during which he had tasted to the full such good things as the world has to offer—wealth, distinction and honours—Sir A B slipped out of it in the same town, amidst the same humble surroundings, and probably in about the same number of hours as he had taken to slip into it seventy years before.

* * *

I am going to resurrect SAMBO, not the Little Black Sambo of our childhood but the Society for the Annihilation of Milk Bottle Offenders, and I hope these offenders will meet an even stickier end than befel the tigers which disrobed L.B.S. If they too are turned into butter, may it be so rancid that it will stink in the nostrils of their fellow-men. The aim of the new society will be to compel anyone who breaks a milk bottle on the highway, and does not forthwith remove every particle thereof, to drive his tricycle, bicycle, autocycle, motor cycle, car, lorry, or other conveyance through the pieces of the said bottle until their tyres resemble mine.

* * *

Our Towns: A Close-Up, just published by the hygiene committee of the Women's Group on Public Welfare, is a social document of first-rate importance, and though it calls itself "a thinly disguised report with no pretension to literary merit," it is written in plain, straightforward, homely English in the best tradition. The section on swearing has a delightful story of a three-year-old sitting on a coat and stripping hops with a dummy in her mouth, who, on running short of hops, removed the dummy, gave a piercing yell of "more bleedin', bloody 'ops" and then put the dummy back again. The committee were unable to take this very tragically; their comment is: "Her trouble clearly was that she saw too much of her elders." Much swearing, they point out, has no evil intention, and only when there is underlying spleen and cruelty is it vicious. On the other hand, swearing does merge into obscenity which is coarsening and offensive; and like other clichés oaths militate against articulateness. I have no evidence, but I suspect that swearing is more rampant in this country than in most and that this is one reason why we are such an inarticulate nation. Among medical students, for example, the language of the dissecting-room dominates the whole of the subsequent undergraduate career. The book contains much sound common sense on the vexed question of bed-wetting; the appendix on this subject advocates a plan which I am quite prepared to believe will work, though I doubt whether the average four-year-old will "last out" 12 hours at night, and it seems unnecessarily Spartan to make children of this age walk to the lavatory. The argument is that if the child is lifted to pass water when he is half awake, in a short time he will pass it when he is fast asleep. I am prepared to allow a child to be lifted about 10–11 PM up to the age of five. One of the most extreme examples of nocturnal enuresis I have heard of is reported here: a family had been rehoused and a voluntary society had given them two double beds. The family all slept in one room—the parents and baby in one bed and three children in the other. After three months the steel mesh of both beds was rotted through in a large central hole. The scientist in me cannot help wondering whether this was due to the quality of the steel or the potency and volume of the urine. The report recommends that a Royal Commission should be set up to inquire into the instalment purchase of soft goods and footwear; that a public utility concern should manufacture soluble sanitary towels at a low price for widespread sale, and that slot machines supplying them should be installed in schools, maternity and child-welfare centres, and factories; and that a square-toothed steel nit-comb should be put on the market at a price within the reach of all. Local authorities naturally come in for a good deal of legitimate criticism, and so do some of our privately owned schools. Many annual medical reports of local authorities are said to be misleading because medical examinations in schools are seldom unannounced. Mothers titivate up a usually neglected, dirty child for the occasion and immediately thereafter allow him to lapse into his accustomed state of filth, lousiness and raggedness. There is little in the book that the average panel doctor in town practice did not know, but it collects the facts and presents in a clear, honest manner a startling composite picture of the conditions under which many of our patients live

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Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M P

ANY Member of Parliament would tell you if you asked his opinion that the week under review has been quiet. There have been no crowded sessions and some have been sparsely attended. But great issues have been passed in review. The Chancellor of the Exchequer has asked for an additional thousand million pounds, and obtained them after a short debate only running to 16½ columns in Hansard. A bill has been passed for the promotion of hydro-electric development in Scotland, the Town and County Planning (Interim Development) Bill has been passed through all its stages, and a motion has been passed approving of the continuation of the conditions under which the Government of Burma carries out its functions although in exile in India. Any one of these subjects is of great import, not to mention the Nurses (Scotland) Bill, which applies, with small differences, the new arrangements for assistant nurses recently made for England and Wales to Scotland.

This legislative activity, however, is but the foreground of politics. The heart of it is in the world struggle of the battlefields in West and East, and on the international plans which are being made behind the battlefront.

The declaration of principles of the United Kingdom delegation to the International Food Conference has only just been made available in a limited number of typed copies in the library of the House of Lords, and yet on the discussions at this conference the world policy as to the production of food may be based for a long time. A world organisation of supplies of food and of materials is shaping itself behind the councils of the battlefronts of the world, a world organisation designed for the period of world rebuilding after the postwar emergency period has passed. Meantime it seems probable that something on the lines of the International Labour Organisation and International Health Organisation will be set up for the international committee of food, with the object of providing plenty for all men of all races and of all countries.

FROM THE PRESS GALLERY

Nurses' (Scotland) Bill

IN moving the second reading of the Nurses (Scotland) Bill in the House of Commons on May 27 Mr. T. JOHNSTON, Secretary of State for Scotland, pointed out that the English bill, recently before Parliament, was based on the recommendations of the Athlone Committee who held that the status of assistant nurse should be defined and recognised. The Alness Committee, who examined the matter from the Scottish point of view in 1938, had taken an entirely opposite view. They were informed that at that time the number of assistant nurses in Scotland was negligible, and concluded that recognition of assistant nurses would lower the status of the profession and not be in the public interest. Now that the English Bill had been passed, the danger was that Scotland would be flooded with low-standard and unrecognised nurses from south of the Border. Lord Alness and his committee were consulted and they stood by the terms of their report, but they were persuaded to agree to a compromise by which the grade of assistant nurse would only be recognised in Scotland for a period of five years. That was the first divergence between this and the English bill. In clause 14 power was given to the General Nursing Council to frame rules under which they might in appropriate cases remit part of the period of training for assistant nurses who were studying or proposed to study for the full certificate under the 1919 Act. There was no intention to set a lower standard for Scotland than for England, and there would be complete reciprocity between the two sets of assistant nurses. Other steps would be required to ensure adequate nursing facilities in Scotland. They were short of nurses, for example in tuberculosis institutions. The Government were discussing with voluntary hospitals how they could affiliate emergency hospitals for training purposes and rotate student nurses during training through two or more such hospitals. He would like to see more hostel accommodation, so that the nurses could live out and less of the barrack room system.

In the debate, details were criticised in detail, but a general desire was shown that the bill should be passed speedily into law. Mr. J. WESTWOOD, parliamentary under secretary of state for Scotland, emphasised Mr. Johnston's assurance that there was no intention to dilute the nursing profession; the aim was to keep up the standard and increase the numbers of qualified nurses, as an essential part of a comprehensive health service.

QUESTION TIME

Supplies for Belgium

Mr. L. SILKIN asked the Parliamentary Secretary to the Ministry of Economic Warfare whether he was aware of the heavy mortality among Belgian children due to serious shortage of food.—Mr. D. M. FOOT replied: While it is true that the food shortage in Belgium is felt severely by the child population, my information does not confirm that, taking the country as a whole, these conditions have caused any striking increase in child as distinct from infant mortality. According to statistics recently published in Belgium there was last year a fall in the death-rate of infants under one year. The figures for deaths per thousand live births were in 1939, 73; in 1940, 89; in 1941, 65; and in 1942, 78.

National Medical Service

Sir ERNEST GRAHAM-LITTLE asked the Minister of Health if he could now inform the House what answer he had given to a large meeting of medical practitioners held recently to discuss future arrangements for medical practice.—Mr. E. BROWN replied: I am not sure to what meeting my hon. friend is referring, but I think it may be well to make clear the situation which he obviously has in mind. After the announcement by the Government in February last that they accepted in principle Assumption B of the report of Sir William Beveridge and would proceed with the preparation of a comprehensive national health service for the whole population, I began discussions with representatives of the medical profession, voluntary hospitals and local authorities as to the best ways and means of organising such a service. These discussions were, by agreement, to be nothing more than confidential and preliminary talks without commitment on either side, and for the medical profession they were conducted by a representative committee of medical men and women brought together by the British Medical Association in collaboration with the Royal Colleges. As a basis for discussion, I have from time to time put ideas of my own before this committee, and have invited them similarly to let me have their ideas and their full and free criticism of mine. In this way my intention was to arrive at a stage when I could review the whole subject in the light of these discussions, and could then pass from the preliminary stage by publishing a general statement of proposals for open and public discussion in Parliament and elsewhere. Recently this committee came to me with the suggestion that the whole subject should now be referred to a Royal Commission. We considered this suggestion together, however, and it was agreed that the discussions between the committee and myself should continue on the basis—which I for my part had always tried to emphasise in the previous discussions—that the Government was in no way committed to any particular method of organising the new service, that every kind of proposal which might be put forward on the subject would be equally carefully reviewed and that, as before, the discussions would commit neither side. The discussions have already been resumed in a very helpful spirit, and I feel sure that before long I shall be able to look at the question as a whole, in the light of all the views expressed to me by this and the other representative groups, and then to publish a statement of the general proposals which I feel should be put before the House and the country for full discussion before any legislation is embarked upon.

Mr. S. STOREY: In view of the British Medical Association's statement published in the *Lancet* of May 22, and in view of their statement that in the opinion of their representative committee the proposals are quite unacceptable to the great majority of the medical profession, will the Minister now consider issuing a White Paper setting out the proposals made as a basis of discussion between the medical profession, the local authorities and the voluntary hospitals, and can he arrange for a debate in the House?—Mr. BROWN: Not until the discussions with all three bodies are concluded.

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Mr. G. MANDER: Is it not a fact that the BMA put forward counter proposals of their own, and does the Minister intend to publish these and his own proposals?—Mr. BROWN: I am glad to say that we have had very fruitful discussions in the last few days. Mr. STOREY: Is it not a fact that the voluntary hospitals do not know what the proposals made by the medical profession and the local authorities are, and that the local authorities do not know what the proposals of the other bodies are? Would it not clear the air if the Minister issued a White Paper?—Mr. BROWN: With regard to the voluntary hospitals, I have received definite and constructive proposals from them only last week.

Mental Treatment

Mr. R. W. SORENSEN asked the Minister whether further consideration had been given to the necessity of including mental treatment services in his plans for a more effective national health and medical service; whether he would ensure an organic relationship between mental and medical health services; and what reply he had given to representations on this issue.—Mr. BROWN replied: The ideas in the question are having full consideration in the preparation of plans.

Captain J. A. L. DUNCAN asked the Minister of Labour what powers he had to direct men and women discharged from the Services on grounds of neurosis or temporary instability to undergo training at residential or other centres under his control; and what steps he was taking to rehabilitate these persons.—Mr. E. BEVIN replied: The treatment and rehabilitation of persons discharged from the Services on grounds of neurosis or temporary instability are undertaken at special centres under the Emergency Hospital Scheme. The centres under my control are vocational training centres, and in so far as persons leaving neurosis centres are in need of learning a new trade, arrangements are made for their admission on a voluntary basis. I have power to direct persons where necessary to the training centres, but I doubt whether compulsion in these cases would be in the best interest of those concerned. Captain DUNCAN: Is the Minister aware that there is a danger in these cases that if action is not taken to direct people to training they may drift into crime or, alternatively, may be a burden on the state for the rest of their lives?—Mr. BEVIN: It is doubtful whether in neurosis cases compulsion is the right method to use. It is a difficult subject.

Regulation 33B

Dr. E. SUMMERSKILL asked the Minister of Health whether, in view of the fact that a woman informed against under Regulation 33B was imprisoned for failing to complete treatment, he would consider penalising the men who informed against her for any default in treatment.—Mr. BROWN replied: No. There is no power under the regulation to deal with the persons indicated in the latter part of the question. Dr. SUMMERSKILL: Can the Minister justify the position in which an individual informed against under Regulation 33B can be sent to prison, but the two informers, people suffering from the disease and liable to transmit it to innocent people, are not penalised in any way?—Mr. BROWN: They themselves are undergoing treatment and the House fully understood that when the regulation was made. Dr. SUMMERSKILL: Is the Minister aware that those individuals can default in their treatment and not be penalised?—Mr. BROWN: I am watching the operation of the regulation to find out whether this supposition is actually working out in fact. Dr. SUMMERSKILL: While the Minister is watching the operation of the regulation, is he aware that these people who are defaulting in treatment are transmitting this disease to their innocent wives?—Mr. BROWN: I am aware that the hon. lady makes these assumptions, but she does not give us the facts.

Milk and Vitamins Schemes

The regulations of the national milk and vitamins schemes have now been adjusted to allow widows and children of Servicemen to continue to receive free milk and vitamins, where such widows and children were receiving these commodities free prior to the death of the husband or father, provided that the normal weekly income from all sources remains unaltered except by the substitution of a pension for the Service allowance. The concession will be extended to widows and children of men who were not Servicemen where the circumstances are parallel. (Mr. W. MABANE replying to Sir DOUGLAS THOMSON.)

Letters to the Editor

REFRIGERATION IN SURGERY

SIR,—The experiences we have reported with refrigeration for limb operations (*Arch. Surg.* 1942, **44**, 139; *Arch. phys. Ther.* 1942, **23**, 711; *Anesth. and Analges.* Sept.–Oct. 1942; *Anesthesiology*, 1943, **4**, 12; *J. int. Coll. Surg.* 1942, **5**, 125) have received extensive confirmation in America without any dissent. For convenient and efficient analgesia this method ranges from the placing of a rubber band around a finger and immersing the finger in ice water for 15–30 minutes in preparation for opening a felon, to the use of a thigh tourniquet and covering the limb with shaved ice for 2–3 hours as the preliminary to a major amputation. The outstanding advantage is that such operations are entirely devoid of shock. Other points of value for war surgery are that the method greatly lengthens the time for which a tourniquet can be applied with safety; it radically checks pain, hæmorrhage, shock, infection, toxic absorption and tissue devitalisation; and it creates a condition in which limbs can either be operated on promptly, or can be kept comfortable during transport of the patient or pending delayed operation under emergencies.

Although this operative method has received notice in Great Britain, some additional ideas on temperature control may be less familiar. There seems to be good theoretical and experimental evidence that a moderately reduced body temperature, due to true shock rather than exposure, should be regarded as a beneficent reaction, and that the widely prevalent custom of artificially overheating such patients is injurious. While it is agreed without dispute that local reduction of temperature is a powerful preventive of shock from limb wounds, the benefit for treatment of existing shock has been denied. In a forthcoming paper (*Amer. J. Surg.* June, 1943) I shall present the first experimental evidence of the benefit of local chilling for shock emanating from the limbs. Others have anticipated us in the use of local reduction of temperature for frostbite. Burns, however, constitute a numerous class of casualties which, because of their superficial character, are amenable to refrigeration treatment not only on the limbs but everywhere. The benefits of cold, at least for one to several days after the burn is received, consist in control of pain which largely obviates the need for morphine, in arrest of infection, reduction of shock, œdema (including blistering and oozing) and toxic absorption, and a favourable influence on healing with formation of a more pliable scar. The note to this effect by Fay (*J. Amer. med. Ass.* 1943, **121**, 1109) and our own small experience to be published in May or June in the *New York State Journal of Medicine* should be tested by surgeons having more abundant material. The plan does not conflict with any of the customary modes of treatment but can be used in combination with them. Finally, in any necessary skin-grafting, analgesia with cold is convenient and harmless for either donor or recipient sites (Mock, *Bull. Amer. Coll. Surg.* 1943, **28**, 56).

New York. FREDERICK M. ALLEN.

RESPONSIBILITY IN HOSPITALS

SIR,—The "sorry picture" of life in the municipal hospital, depicted in your leading article of April 3, has now been copied and embellished by so many less eminent artists that you may think it is time to change the subject, but before you do so, I should like to revert to the "responsibility in hospitals" as it was entitled. This is an important subject and consideration of it may provide a clue to much of the embittered criticism of the municipal hospitals and may help to explain the fact that those whose lives have been spent in association with voluntary hospitals sometimes fail to appreciate the reasons for any system other than that with which they are familiar.

Voluntary hospitals express some special interest and are designed to meet some particular and limited demand. In the past they have been built anywhere, according to the whim of those who provided the money or the doctors who provided the professional urge. They have not been distributed according to wide public need. Little special hospitals are scattered about in the most arbitrary way, and the so-called general hospitals never provide a

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complete hospital service for the neighbourhood. The problem is not considered as a whole. A section of the field is for some reason interesting, and provision is made to gratify the interest. This specialist and restrictive attitude of mind pervades the whole of the voluntary system. When a patient of the correct category is admitted and is placed under the care of some particular doctor, full responsibility is accepted for him. In many hospitals the patient is given the best possible care and the doctor-patient relationship is developed to the highest degree; but little responsibility is felt for patients who are excluded because they do not come within the field of interest of the staff, or because beds are not available for them. Their names are placed on a waiting-list, or they are advised to apply elsewhere.

Again, it is not always realised that a patient on discharge from a hospital should be reasonably fit to cope with the conditions to which he will be exposed outside. The efficiency of the hospital is apt to be measured by the average length of stay. Voluntary hospitals commonly close down for cleaning or other reasons without bothering much about what happens to the people whose hospital service is thus suddenly cut off. In the hospital itself the work tends to be divided up into departments or units, each member of the staff often limiting his feelings of responsibility to the section with which he is immediately concerned. The whole organisation is rather static and slow to respond to changes in popular requirements. This limited sense of responsibility is not always recognised and simple people sometimes mistake it for a love of freedom.

In municipal hospitals the atmosphere is not the same. A local authority on which is placed the duty of caring for the sick of its area has very wide responsibilities. It must provide a general service and cannot make arbitrary selections according to the interests of the doctors, but must make provision of all kinds and be rapidly responsive to changing need. In a municipal hospital the officer on whom the authority places general responsibility is the medical superintendent and it is his duty to see that the hospital provides the necessary service to the neighbourhood and that every patient admitted to hospital receives proper treatment. As municipal hospitals have developed and staffs have increased, less and less of the treatment is administered by him personally and more by consultants and specialists, entrusted with full clinical responsibility; but general responsibility remains with the medical superintendent and as power and responsibility are complementary he must be in a position to adjust the activities of the hospital to the daily requirements of the community served.

The direction of the activities of an organisation towards a common end must inevitably involve some limitation of individual freedom, but if the purpose is understood such limitation should be accepted as a contribution to the common good.

Liverpool. HENRY H. MACWILLIAM.

SULPHADIAZINE AND THE PARATYPHOID B CARRIER

SIR,—The failure of sulphaguanidine in the treatment of chronic paratyphoid carriers discussed by Major McNair Scott and his colleagues (*Lancet*, April 17, p. 487) emphasises once again the problem of treatment of the chronic carrier state following enteric fever. The apparent cure of the following case of a chronic *Bacterium paratyphosum B* carrier by sulphadiazine is of interest in this respect.

A woman, aged 40, was admitted to hospital on July 30, 1941, with a provisional diagnosis of enteritis. Bacteriological examination of the fæces revealed *Bact. paratyphosum B*. The patient was then transferred to the local isolation hospital. Fourteen months later, on Oct. 6, 1942, she was readmitted for cholecystectomy and treatment as a chronic *Bact. paratyphosum B* carrier; 9 weeks before readmission she had had an attack of diarrhœa and vomiting associated with generalised abdominal pain lasting 5 days. Apart from this attack she presented no symptoms. Bacteriological examination of the fæces revealed *Bact. paratyphosum B*. Examination of the urine was negative. Straight X ray of the gall-bladder showed it to be full of stones. Cholecystogram with sodium tetraiodophenolphthalein ('Umbramax') did not show any concentration of the dye. Cholecystectomy and appendicectomy were performed. Cultures from the gall-stones and gall-bladder wall gave a growth of *Bact. paratyphosum B*. Recovery from the operation was complete and uneventful. Culture of the fæces 12 days after operation gave a growth of *Bact. paratyphosum B*. She was then given a course of sulphapyridine—a total of 44 g. over 7 days. Re-examination of the fæces at the end of this period revealed the same organism. A course of sulphaguanidine—34 g. over 6 days—was then given. She continued to excrete *Bact. paratyphosum B* in the fæces. Finally she was given a course of sulphadiazine—23 g. over 6 days. Repeated culture of the fæces over the following 3 weeks failed to give a growth of *Bact. paratyphosum B*, and the patient was discharged as cured.

No conclusion can be drawn from this single case, especially in view of the fact that chemotherapy was carried out after the gall-bladder had been removed, but the apparent success with sulphadiazine after the failure both of sulphapyridine and sulphaguanidine is of interest. It is possible that sulphadiazine might be effective in these intestinal carriers whose bile is free from the enteric organism responsible for the carrier state. Major McNair Scott and his colleagues report failure with sulphadiazine in one chronic intestinal carrier, but culture of the bile was positive in this case.

I must thank Dr. G. L. Findlay, acting medical superintendent, for permission to publish this case.

County Hospital, Whiston, Lancs. G. L. MANSON.

THE STRANGE CASE OF MR. HUXLEY'S EYES

SIR,—The hypothesis advanced by Professor Hartridge, though ingenious, will not, I am afraid, bear scrutiny. Leucocytic deposits on the posterior surface of the cornea, which are commonly known as keratitis punctata, do not constitute a disease in themselves but are merely a manifestation of the active stage of uveitis. Pari passu with resolution of the uveitis these deposits are absorbed or, less commonly, are replaced by newly organised fibrous tissue. No corneal deposits would therefore have been present in Mr. Huxley's case unless a recurrence of the uveitis had recently taken place.

It is well known that corneal nebulæ due to scarring tend to become less opaque with the lapse of time, owing to a gradual rearrangement of the bundles of scar tissue, but this process is necessarily a slow one.

Is it not possible that the rapid improvement in vision which Mr. Huxley describes was of a functional nature?

Wimpole Street, W.1. R. AFFLECK GREEVES.

REHABILITATION AFTER MENISCECTOMY

SIR,—In their paper of Feb. 13 (p. 197) Major Duthie and Captain Macleod state that, at a military convalescent depot, the average period off duty after meniscectomy is 82 days; and wasted quadriceps, effusion and limitation of movement were found in the majority of cases. From personal experience of giving postoperative physiotherapy to a large number of patients of all ages and both sexes I can say that all but a very small minority walked without a limp on the 14th day after the operation, went home on the 17th, and began work 10 days later. Quadriceps were equal, movement free and there was no effusion. Those doing heavy work needed 14 days longer on light occupation or convalescing under supervision—42 days in all. Why should recovery take longer? It seems a great waste of time, both for the patient and for the personnel in charge of the case. Is early physiotherapy ordered? Is it too strenuous? Are the patients treated en bloc? It may well be too strenuous, as there is a tendency to overdo a good method. How many of us can contract our healthy quadriceps for five minutes by the clock without fatigue and without the movement deteriorating in quality? Early postoperative treatment is essential and calls for expert judgment of the quality of movement. It is highly skilled work.

The "en bloc" method cannot produce a uniform result. There are lazy patients, unwilling patients, over-timid or over-bold. All need to be considered separately. We have what we call a "routine" treatment. It provides a base of operations but can be presented in many forms to suit the individual. Though it is more trouble, it is far more worth while from every point of view.

Savernake Hospital, Marlborough. OLIVE F. SANDS, CSMMG.

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THE SPECIAL CENTRE

SIR,—Dr. Philip Ellman's broadminded observations on the relation between special and general medicine are opportune. His plea for a return to that more balanced outlook which characterised the older school of clinicians is especially welcome at a time when, amid all the political planning for the future of medicine, so much that practical experience has shown to be of incalculable value is in danger of being thrown into the melting-pot.

His tentative suggestion that specialised units should be housed in a general hospital under one coördinated system has much to commend it from the point of view of effective organisation, but I venture to think that it does not offer the ideal solution of his problem. The proposal has been encouraged by not a few teachers, some of whom have gone so far as to urge that the special hospital is redundant, and that its functions could be performed equally well, if not better, by a special department of a general hospital. This view is certainly not shared by those with intimate experience of the work of the great special hospitals, for the contribution of which to our system of medical training there is no real substitute. I am not inferring from Dr. Ellman's letter that he favours the abolition of the special hospital—I am sure this is the last thing he would desire—but I feel strongly that the lack of perspective which he rightly deplores is largely the fault of the teaching staffs of the general hospitals today, which are being recruited more and more from the ranks of the experimentalists and less and less from clinicians whose preliminary training has been based upon a study of the humanities.

I am well aware that this view is as unpopular as it is old-fashioned, but it can hardly be denied that in the days when teaching was given by senior consultants in active practice in general medicine, including those aspects of the subject which primarily concerned the general practitioner, the student emerged finally with a knowledge of social medicine not far removed from the ideal to which so much attention has recently been paid by our would-be reformers. If the methods of the great teachers of former days were better studied now, they might possibly convince some of our modern enthusiasts of the truth of the adage that there is nothing new under the sun, and provide an opportunity for many of the best clinical traditions to come into their own again.

Harley Street, W.1. MAURICE DAVIDSON.

DOCTORS AND THE FUTURE

SIR,—Your leading article of May 23 does not seem fully to deal with the points raised in the letter to which it refers. The production of a really concise résumé of the evidence does appear necessary for the following reasons: (1) The younger doctors, many of whom are serving overseas, cannot have ready access to, or opportunity for studying and discussing, long reports. (2) Those who are carrying on civilian duties are working at high pressure and have neither the time nor the reserve of mental energy to enable them to do so. Can changes, affecting the whole future of medicine in this country, justly be forced upon them at a time when, owing to war conditions, they are virtually muzzled? They, no less than other members of the community, are entitled to the benefit of the democratic principles for which, we are informed, we are fighting this war. The smooth running of any scheme must depend on the willing coöperation of the doctors: they, after all, would do the actual work.

Bournemouth. A. BASIL ROOKE.

JAUNDICE AND THE SYRINGE

SIR,—Lieut.-Colonel Bigger's note in your issue of April 10 on jaundice in syphilitics is welcome. May I add my own practical experience which has led me to the same conclusion. In our venereal diseases clinic I was alarmed by the high incidence of jaundice which reached a percentage of 10 to 12 in cases under intravenous arsenical treatment. I thought the faulty disinfection of syringes, which was done in the way described by Bigger, might be a source of infection. For several months, therefore, I have been using only freshly boiled syringes for such injections, and have not seen a new case of jaundice in our clinic during this time. Instead of two syringes I have been using about ten. When half of them have been used they are put into the steriliser, gradually heated, boiled and cooled in the ordinary way, while the rest are used. This boiling of syringes, which should be a rule for intravenous medication, irrespective of any theory about a virus, need involve little additional work or time.

Health Dept., West Hartlepool. JOHN LISSAUER.

TEMPERATURE TAKING

SIR,—Clinical deductions drawn from oral temperature readings are often fallacious. The aim of taking the temperature is to record the true body heat. The only place from which a true and quick record can easily be obtained is the rectum. In this site a half-minute thermometer will give an accurate reading in half a minute in 50% of cases and is correct after one minute in almost 100%. I have drawn certain conclusions from many thousands of rectal temperature readings taken simultaneously with those in the mouth.

(1) The normal rectal temperature is 98·4° F. if the patient has been at rest for half an hour. It is *not* 99·4° or a degree higher than the oral.

(2) Exercise will cause a rapid rise of rectal temperature dependent on the energy expended. A game of squash racquets will often produce a temperature of 102° F. This pyrexia is a physiological tonic.

(3) There is often a great divergence between rectal and oral readings after one minute—e.g., oral 99°, rectal 102°.

(4) Oral temperatures roughly correspond to the cutaneous reading and the latter is qualified by climate and skin circulation.

(5) It is waste of time to spend ten to twelve minutes in order to obtain a fairly accurate oral temperature.

From comparison of oral, rectal, axillary and cutaneous readings, taken both with thermometers and a pyrometer, I am of the opinion that rectal temperature readings are much the quickest and most reliable clinical guide and should be substituted for oral readings.

Manchester Square, W.1. H. W. HALES.

SIR,—For many years it has been my practice to replace the thermometer, without shaking it down, in the mouth after observing the first reading, and to repeat this replacement until two consecutive readings were the same. In this way a slow thermometer is not liable to mislead and the temperature of the patient's mouth is allowed to reach the highest level before the observation is completed.

London, S.W.15. E. L. MIDDLETON.

NATIONAL COUNCIL OF MENTAL HEALTH

SIR,—Doubtless owing to an oversight, no reference is made in your annotation of May 29 to the pioneer voluntary mental health agency—the Mental After-care Association. This association, which was for many years the only organisation of its kind, works in the closest coöperation with many public bodies throughout the country, particularly with the London County Council, which is represented on its governing body. It is in full sympathy with the ideals of the Provisional National Council and has recently complied with a request from the Ministry of Health to submit its views as to how these might best be attained. It was unable to join in the amalgamation scheme advised by the Feversham Committee, but continues its wholehearted coöperation with the bodies which did so. To describe those bodies as "the three principal voluntary associations" is an inaccuracy which all concerned would wish corrected. In this connexion may I refer to your annotations in the *Lancet* of April 3 and 10 on the annual meeting of the Mental After-care Association held recently in London.

Eagle House, 110, Jermyn Street, S.W.1. HENRY YELLOWLEES, Chairman of the Mental After-care Association.

THE *Palestine Post* reports that two Jewish scientists—Dr. Felicien Zipser, a physician, and Dr. Richard Marberger, a chemist, have been treating typhoid with a preparation containing tin. They have carried out large-scale experiments in the past year, and claim that the drug reduced the length of the disease and lowered the death-rate. An American medical mission consisting of three professors from Columbia University is said to have completed an inquiry into the value of the method.

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Obituary

JAMES EWING

M D COLUMBIA

Professor Ewing of Cornell University, N.Y., who died on May 16, at the age of 76, was an international authority on the pathology of tumours. He held this position not merely because of his book "Neoplastic Diseases," first published in 1919, which is the standard work of reference on all oncological matters, but also because throughout his life his critical analysis of tumour material did much to clarify problems of human cancer. Although interested in and appreciative of, the enormous amount of work being carried out in experimental carcinogenesis in animals, yet his aim was that expressed in the preface of his book "that by rendering more accessible to English readers the knowledge of tumours he may contribute something towards the reduction of the mortality from cancer"; and so it was that his orientation was ever towards the diagnostic and prognostic value of tumour pathology rather than its pure scientific interest.

His many writings dealt with tumours of almost every region and type; indeed there is seldom an article on human cancer but that there is a reference to Ewing. In 1913 a paper on endothelioma of lymph-nodes emphasised the distinction between the diffuse carcinomatosis of a lymph-node and the primary tumour of lymphoid tissue formed of large pale cells—which he suggested should be called reticulum-cell sarcoma, a title which has now commonly been contracted to reticulosarcoma. The discussion as to the true incidence of malignant change in chronic peptic ulcers, excited by remarkable figures from workers at the Mayo Clinic, was rationalised by a masterly review of the subject in 1918 which the careful work of Stewart and Newcomb has substantiated; more recently his contribution to the conference on gastric cancer held at Bethesda in 1940 was an admirable commentary on current views and work.

Eponymically Ewing's name will ever be associated with tumours of bone. He had much to do with the foundation of the bone-sarcoma registry of the American College of Surgeons and introduced the term "osteogenic sarcoma." In a paper on the classification of bone tumours, published in 1922, he described a non-osteogenic tumour of bone, with clearly defined clinical characters, as a diffuse endothelioma or endothelial myeloma of bone. Partly on account of his original description, and partly owing to lack of agreement as to its histogenesis, it has come to be known as Ewing's tumour of bone. It has probably caused more acrimonious debate than any other recent observation in morphological pathology. There was general agreement that a tumour with the clinical and radiographic features described by Ewing existed, but whether it was a pathological entity, and if so what was its nature, was far from certain. Willes suggested that most, if not all, Ewing's tumours were metastases from neuroblastomata; Oberling and Raileanu and others believed that they were all reticulosarcomata; but recent papers such as those of Foote and Anderson, and Sharpure (1940) have substantiated Ewing's contention that it is in reality a tumour derived from primitive vascular endothelium and distinct from the primary reticulosarcomata of bone. Ewing himself in 1939 gave an admirable review of the classification of bone tumours in which he upholds his original contention as to the nature of his tumour.

At the International Conference on Cancer held in London in 1928, Ewing read a paper on the causal and formal genesis of cancer, in which he marshalled the evidence from human and experimental work and then suggested that one should recognise two groups of factors, the causal or remote causes of cancer (including heredity, endocrinal imbalance, and carcinogenic agents, on all of which we have considerable knowledge) and the formal or proximate factors—the nature of the cancer process—of which we have limited knowledge in restricted groups of experimental tumours and many theories none of which are entirely acceptable. This concept has proved of value in apportioning the significance of past and subsequent work on the causation of cancer. In 1935 he wrote on the accidental traumatic factor in cancer causation and set out certain postulates which in his opinion must be fulfilled before trauma can be accepted as the inductive agent in particular tumours; it is a paper of great value in relation to claims for compensation in such cases.

This brief sketch of long and fruitful labours may suffice at least to show how much help Ewing's critical sense and great experience has given to the practising pathologist.

GEORGE RAMMELL FOOTNER

OBE, M B CAMB, F R C S

Mr. G. R. Footner, who died on May 16 at the age of 63, will long be remembered in the Sudan for his work as a surgeon and as a teacher of surgery.

Footner was educated at Marlborough, Cambridge and St. Thomas's. He won the university scholarship to the hospital and later tied with L. E. C. Norbury for the Beaney scholarship in surgery. He was one of the outstanding batsmen in his college and hospital cricket teams. He held all the junior surgical house-appointments but when Norbury obtained the surgical registrarship in 1907, Footner went as RSO to the Royal Infirmary, Derby. In 1910 he joined the Sudan Medical Service, then the most highly qualified though smallest service of its kind. His work at first gave little scope for his surgical talent, but when the civil medical service gradually took over the work in the Southern Sudan from the medical corps of the Egyptian army, Footner was appointed medical inspector to the Upper Nile Province. In his pioneer medical work among the Dinka, Shilluk and Nuer tribes, based on his headquarters at Malakal, he made great use of the Nile hospital ship, the *Lady Baker*, which he helped to organise and equip. Unfortunately an encounter with a wounded lion nearly cost him a limb and resulted in an almost completely ankylosed knee. On recovering from the injury he was transferred to Khartoum as the first senior surgeon appointed in the Sudan Service which was then rapidly developing. Later he became as well the first lecturer and teacher of surgery in the newly constituted Kitchener Medical School. In 1928 he retired from the Sudan and from medical practice, living first at Winchester and later in Cornwall. At the outbreak of war he undertook work of various kinds, mainly medical boards and helping in local general practice.

A colleague writes: Footner's tall spare athletic figure commanded attention. He was a fine example of the type of surgeon most needed in the tropics where character and example as well as professional ability are important. He had strong sensitive hands and a sound surgical technique. A man of high purpose he demanded an efficient standard from others as well as from himself. He was intolerant of anything slipshod or second-rate, and he exercised an enduring influence on his Sudanese medical students. He bore his last illness with courage and fortitude and was working to within ten days of his death. He leaves a widow, a daughter and two sons.

DORA LUSH

M SC MELB

NEWS was received from Australia last week of the tragic death at the age of 34 of Miss Dora Lush. She had accidentally infected herself in the laboratory with scrub-typhus through the slipping of a syringe. Miss Lush had worked since 1935 with Dr. F. M. Burnet at the Walter and Eliza Hall Institute, and had proved herself most skilful in the laboratory. From work with staphylococcal bacteriophages she passed to studies of a number of viruses, chiefly in collaboration with Burnet, and she was particularly expert at the egg-inoculation techniques which he has developed. The outbreak of war did not deter her from a proposed visit to this country, and she worked at the National Institute for Medical Research from early in 1940 till September, 1942. She was a popular and cheerful colleague and seemed to enjoy the blitz. She did thoroughly useful work over here, especially on influenza and typhus, and was one of several who contracted murine typhus in the laboratory at Hampstead, though very mildly. The sad news now received confirms only too well the lack of cross-immunity between typhus and scrub-typhus, or tsutsugamushi disease, of the East.

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Notes and News

NURSES IN MENTAL HOSPITALS

STANDARDS of nursing in different mental hospitals vary considerably, and so do hours of work and conditions of service. The Mental Hospital Matrons' Association ask [1] that the mental-hospital matron should always have direct access to the hospital committee: and that her salary and status should be the equal to that of the general-hospital matron. They advise that nursing subcommittees should be appointed, though they do not define their duties; and they recommend that when nurses are resident their emoluments should be provided in kind, not in cash. The Royal Medico-Psychological Association's examinations should now, they think, be superseded by the state examination in mental nursing. We doubt, however, whether the rise of standards which this implies can be achieved until their other proposals—appointment of qualified sister-tutors, and provision of adequate domestic and porter staff to relieve the nurses—can be implemented. Meanwhile, some of the nurses who cannot reach the theoretical level required for the state examination might perhaps qualify as assistant nurses.

INTERNATIONAL CONTROL OF DRUGS OF ADDICTION

THE League of Nations has recently issued, through its Supervisory Body under the Dangerous Drugs Convention of 1931, estimated requirements of narcotic drugs in 1943. This annual statement forms the basis of the international control of the manufacture and commerce in drugs of addiction, and the experience of the last world war, which led to a real epidemic of addiction, fully justifies this procedure. The report sets out in detail for each country the statistical requirements for 1943 of each of the scheduled drugs. "Owing to delay in communications and probably also to preoccupation of governments with the international situation" estimates were slow in coming in and 23 countries together with 48 territories failed to furnish any estimates at all. On the other hand, the annual estimates were received in respect of 48 countries and 58 territories. For those countries in default the convention of 1931 provides for the establishment of appropriate estimates by the Supervisory Body which will have the same binding force as those furnished by the governments themselves. The right of supplementing any estimates, or revising them, is sanctioned by the convention to meet unforeseen medical or scientific needs. Indeed, last year 71 supplementary estimates were received and dealt with, which reduced the estimates to be framed by the Supervisory Body from 34 to 17.

In the report for 1943 the total world requirements for each drug do not appear to be given as they were last year. Then the grand annual totals were: morphine ((including that for conversion) 49,737 kg., cocaine 4748 kg., heroin 834 kg., codeine 32,776 kg., ethylmorphine 3148 kg. For the current year some sample requirements are as follows. For the United Kingdom: morphine (including conversion) 5978 kg., cocaine 341 kg., heroin 82 kg., codeine 1479 kg. For the United States: morphine 11,232 kg., cocaine 900 kg., codeine 8505 kg., and heroin 0. For China: morphine 201 kg., cocaine 10 kg., codeine 210 kg. For India: morphine 758 kg., cocaine 41 kg., heroin 5 kg., codeine 260 kg. In the case of Japan the figures given by the Supervisory Body are: morphine 5273 kg., cocaine 890 kg., heroin 180 kg., codeine 2288 kg. A branch office of the secretariat of the Supervisory Body has been opened at 1322 Eighteenth Street, North West, Washington, D.C., with a view to facilitating communications with governments and countries outside Europe. Sir Malcolm Delevingne continues to act as president of the Supervisory Body.

University of Cambridge

On May 22 the degrees of MB, BChir were conferred by proxy on A. W. Capon and G. F. Panton, and in person on F. M. P. Eckstein.

1. Leaflet from Miss Olive Ashford, SRN, hon. sec. of the Association, 10, Wilton Polygon, Crumpsall, Manchester 8.

ROYAL COLLEGE OF SURGEONS

This year the college celebrates the centenary of its fellowship (see *Lancet*, May 8, p. 590). The honorary fellowship, however, dates only from 1899, when the council was empowered "to elect such persons whether British subjects or not and whether of the age of 25 years or not as the said council shall deem sufficiently distinguished for the purpose." The number of honorary fellows is limited to 50.

At the close of the Hunterian oration on May 26, Sir Alfred Webb-Johnson, the president, admitted to the honorary fellowship Colonel Elliott C. Cutler, Moseley professor of surgery at Harvard University and chief surgical consultant to the United States Army, and Dr. Wilder G. Penfield FRS, professor of neurology and neurosurgery at McGill University, Montreal. These two surgeons will be taking part in the forthcoming Anglo-American mission to Russia, during which Surgeon Rear-Admiral G. Gordon-Taylor, the senior vice-president of the college, will admit to the honorary fellowship two Russian surgeons, Dr. Nicolai N. Burdenko, director of the operative surgery institute, Moscow University, surgeon-in-chief to the Red Army and president of the Scientific Medical Council of the USSR, and Dr. Sergei S. Yudin, of the Sklifassovski Hospital for Traumatic Diseases in Moscow.

On Thursday, June 10, at 4.30 PM, Mr. E. W. Riches will deliver a Hunterian lecture on the methods and results of treatment in cases of paralysis of the bladder following spinal injury.

ROYAL MEDICAL BENEVOLENT FUND

At the annual meeting held at RSM House on May 25 Sir Arnold Lawson took the chair in the absence (for the first time for many years) of Sir Thomas Barlow, president. Dr. Lewis Glover, treasurer, in presenting his report said that though the income was slightly down the number of applicants was smaller. The fund, he said, aimed to give each of its beneficiaries at least 30*s*. a week after the rent had been paid. The thanks of the fund were expressed to the British Medical Association and the Medical Insurance Agency which had been, as always, generous helpers, and the assistance of the medical press was acknowledged. A special tribute was paid to local honorary secretaries and to the Ladies' Guild which enhances the work of the fund by personal service. A leaflet issued "from the secretary's chair," a week or two ago, says: "At times occurs the thought—will the day come when the fund is unable to help, and the appeal whether from widow, daughter or aged practitioner, must remain unanswered? It is for the present generation of practitioners to refute this possibility and to take their share in a work which is a common professional inheritance and tradition."—The address of the fund is RMBF, 1, Balliol House, Manor Fields, Putney, S.W.15.

Medical Insurance Agency

At a meeting held on May 26 Sir Robert Hutchison was re-elected chairman. Sir Hugh Lett was elected and the following were re-elected to the committee of management: Lord Horder, Dr. Alfred Cox, Dr. James Fenton, Dr. Lewis Glover and Dr. R. W. Craig. The recommendations of the committee included the distribution of £3473 to the medical charities. The report showed that the decline in the agency's motor car business had been considerable, but other branches had suffered less than had been feared.

Cleansing of Dairy Equipment

In Circular 2819 the Ministry of Health says that the most effective and simple way of cleaning dairy equipment is by steam sterilisation, but since present conditions preclude any considerable extension of the use of this method the minister has amended the Milk and Dairies Order, 1926, so as to permit the use of approved sodium hypochlorite solutions for the purpose. Four approved products are here listed; they must have a total available chlorine content of 9–12% by weight, and must also contain not less than 0·7% of sodium chlorate to act as a detector should sodium hypochlorite gain access to the milk. Every vessel, lid and appliance used for containing, measuring or straining milk (except a mechanical milker) must be thoroughly washed after use, and must be cleansed and scalded before it is used again. Where an approved hypochlorite solution is used, all trace of it must be removed before the vessel comes in contact with milk. The equipment must be stored in a clean place, protected from dust and dirt, and must not be used for anything but milk.

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Medical Honour

Lloyd's war medal for bravery at sea has been awarded to Dr. Adeline Miller, ship's surgeon, for her work among the wounded when her ship, the *Britannia*, was sunk. Dr. Miller has also been awarded the MBE.

Medical Casualties

The following casualties among RAMC officers have lately been announced.

Killed.—Captain James Gerard Cassidy, MB NUI, and Captain Daniel Waldron McCarthy, MB DUBL.
Died of Wounds.—Captain William Daniel Miles, MB DUBL.

WS Captain R. G. MacLeod, MB GLASG., RAMC, has been posted as wounded. Dr. C. A. Gibson-Hill is reported to be interned in Singapore.

Return of London Medical Schools

Mr. Harold Claughton, acting principal, in his report on the work of the University of London during 1942–43 remarks that several schools are returning to London provided that essential repairs to their buildings can be undertaken. The medical students of King's College have already returned from Birmingham and the preclinical students of the Middlesex Hospital from Leeds, the London School of Medicine for Women is bringing back its preclinical students from Exeter and the London Hospital its preclinical students from Cambridge. The whole medical school of University College Hospital is also returning to London as the sector hospital which has been used for teaching is no longer available. Among the schools whose buildings have suffered extensive damage are University College and St. Bartholomew's Hospital medical college, and these schools are considering schemes for temporary accommodation after the war so that their return to London need not wait upon the completion of the permanent buildings.

Royal Society of Medicine

On Tuesday, June 8, at 4.30 PM, at the section of therapeutics and pharmacology (which is changing its name to the section of experimental medicine and therapeutics) Dr. R. A. McCance and Miss E. M. Widdowson, PhD, will read a short paper on phytic acid and absorption of iron, Dr. E. N. Allott on sulphaguanidine in ulcerative colitis, and Dr. G. Melton on nicotinic acid in the treatment of asthma. At the section of proctology, on June 9, at 5 PM, there will be a discussion on functional diseases of the colon and rectum. Sir Arthur Hurst, Dr. H. L. Wilson, Dr. Geoffrey Evans and Dr. E. H. Larkin will be the opening speakers. At the meeting of the section of ophthalmology on June 11, at 4.30 PM, Lieut.-Colonel Derrick Vail, USAMC, will speak on chorioretinitis associated with toxoplasma.

Another Visit to St. James' Hospital

Senior surgeons of the Canadian and American Forces including Colonel J. C. Kimbrough, director of professional services to the American Forces, attended demonstrations of the work carried out in the gastric and urological units of St. James' Hospital (LCC) on April 29. During the morning demonstrations were given by Mr. Norman Tanner and Mr. H. K. Vernon in gastroscopy, nephro-ureterectomy for ectopic vaginal ureter and cystoscopy and fulguration of villous growth. In the afternoon there were demonstrations of partial gastrectomy, slide repair of hernia, injection of œsophageal varices and cystoscopy, suprapubic lithotomy modified Harris's prostatectomy, nephrectomy and operation for hæmatocoele. The visit was one of a series provided in the council's medical services for allied and dominion medical officers.

British Association of Physical Medicine

At a meeting held on May 25, with Lord Horder presiding, the election of the council was completed, and the following are now members: Dr. Francis Bach, Dr. L. D. Bailey, Dr. Philippe Bauwens, Dr. William Beaumont, Wing-Commander J. F. Bromley, Dr. Hugh Burt, Dr. F. S. Cooksey, Dr. E. J. Crisp, Dr. C. B. Heald, Dr. Geoffrey Holmes, Lord Horder, Brigadier F. D. Howitt, Dr. James Mennell, Major J. W. T. Patterson, Dr. M. B. Ray, Sir Morton Smart, Dr. Kenneth Stone, Major W. S. Tegner, Dr. Dorothy Wood, Sir Robert Stanton Woods. The council, which will hold office till the next annual general meeting, was authorised to draft a declaration of the objects of the association, the rules as to membership and procedure; and to be guided in these matters by resolutions passed at the meeting on May 5. It was also empowered to appoint the officers of the association.

Lecture on Health in the Factory

On June 10 at the School of Medicine, Leeds, at 2.30 PM, Dr. S. A. Henry, medical inspector of factories, will lecture on the health of the factory worker in war-time. Medical practitioners are invited.

Training School for Mental Nurses

The school set up at Claybury Hospital (LCC) as an experiment a year ago (see *Lancet*, 1942, ii, 234) is now to be established. It serves the eight hospitals north of the Thames and after the war a second school is projected for hospitals south of the river.

Infectious Disease in England and Wales

WEEK ENDED MAY 22

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1740; whooping-cough, 2446; diphtheria, 619; paratyphoid, 4; typhoid, 12; measles (excluding rubella), 8377; pneumonia (primary or influenzal), 672; puerperal pyrexia, 183; cerebrospinal fever, 68; poliomyelitis, 7; polio-encephalitis, 0; encephalitis lethargica, 0; dysentery, 146; ophthalmia neonatorum, 97. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on May 19 was 1963. During the previous week the following cases were admitted: scarlet fever, 145; diphtheria, 45; measles, 134; whooping-cough, 39.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 7 (1) from measles, 15 (1) from whooping-cough, 12 (2) from diphtheria, 63 (16) from diarrhœa and enteritis under two years, and 15 (3) from influenza. The figures in parentheses are those for London itself.

Newcastle-on-Tyne reported 5 deaths from diarrhœa, Birmingham 4. There were 3 deaths from whooping-cough at Manchester.

The number of stillbirths notified during the week was 221 (corresponding to a rate of 31 per thousand total births), including 18 in London.

Appointments

CALM, A. W., MD GÖTTINGEN: full-time radio-diagnostician at the Northampton General Hospital.
LINDSAY, S. S., MB LOND., DOMS: examining factory surgeon for Greenwich.
STALKER, W. F., MB GLASG.: examining factory surgeon for Scarborough, Yorks.
WIGGLESWORTH, F. W., MB LEEDS: RSO at Bradford Royal Infirmary.

Births, Marriages and Deaths

BIRTHS

ERSKINE.—On May 28, in London, the wife of Dr. John Erskine—a son.
MACLAREN.—On May 26, in London, the wife of Captain Colin Maclaren, RAMC—a son.
STRANG.—On May 25, at Northampton, the wife of Major T. Murray Strang, RAMC, of Wellingborough—a daughter.
THOMSON.—On May 25, at Pembury, the wife of Dr. L. C. Thomson—a son.
TILLMAN.—On May 26, in London, the wife of Dr. W. G. Tillman—a son.
UNKAUF.—On May 22, at Weybridge, the wife of Dr. Byron Unkauf, of Winnipeg, Canada—a son.

MARRIAGES

DORAN—KING.—On May 25, at All Saints' Church, Fleet, Flight Lieut. Francis Doran, FRCS, flight-lieutenant RAFVR, to Cecily King, section-officer, WAAF.
ROSS—MCNEILL.—On May 8, at North Elmham, Norfolk, John Macaulay Hamilton Ross, FRCSE, of Sunderland, to Mairi McNeill.
SOUTAR—SMALLWOOD.—On May 28, in London, Kenneth Andrew Soutar, MRCP to Margery Smallwood.

DEATHS

MCCLOY.—On May 27, in Belfast, John Moorcroft McCloy, MD RUI, DPH.
MARSHALL.—On May 23, at Witney, Thomas Bingham Marshall, MRCS, aged 69.
PEACOCK.—On May 26, at Whitburn, Durham, Edith Grace Peacock, MRCS.
SECCOMBE.—On May 25, John William Smyth Seacombe, OBE, MRCS, DPH, late major RAMC, aged 66.
WARE.—On May 24, at Godalming, John William Langston Ware, MRCS, aged 87.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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TREATMENT OF THE INJURED WORKMAN *

H. E. GRIFFITHS, M S LOND, F R C S
SURGEON TO THE ALBERT DOCK HOSPITAL, LONDON

THE treatment of the injured workman should not differ in any material way from that afforded to any other member of the community; but when the manual worker is selected as a type the principles underlying treatment are perhaps made easier to understand.

The object of treatment is to effect a cure—that is, to obliterate altogether from the mind and body of the patient the effects of the injury sustained. Since in the human body repair does not occur without the formation of scar, 100% anatomical and physiological recovery is not possible and some standard short of that must perforce be accepted. In my opinion the best results can be obtained by accepting the restoration of full working capacity as the criterion of recovery.

POWER IN MUSCLE-ACTION

Before we can set out to obtain this cure, we must determine what the workman has lost as a result of his injury and what we must restore. In a word: what is working capacity? It may be ability to stand, walk, run, jump, climb, pull, push, lift, turn, twist, manipulate; but above all, to endure. Loss of any one of these attributes is the result of loss of power; therefore, whereas the criterion of recovery is restoration of working capacity, the goal of treatment is power.

Power is produced by muscle-action, and in man muscle-action is the only method of expression of power. Whether he be professional pugilist or poet, fighting, declaiming, dictating or writing, the final medium of will or thought is muscular action.

None of the voluntary muscles works alone. Each works in a carefully balanced group: while one muscle contracts its antagonist elongates, just retaining sufficient tone to ensure that smooth and rhythmic movement shall be attained or that a static position against resistance shall be maintained with the minimum amount of effort. When a muscle contracts, its points of attachment tend to approximate, and that is only possible if the joint or joints crossed by the muscle or its tendons move. Muscle power may be

"... increased or conserved by the play of the tendons over fulcra produced by bony projections of fibrous tunnels. It follows, therefore, that if the muscles are to act to the best mechanical advantage, anatomical reconstruction of bone and soft parts must be as perfect as possible; but efforts at this reconstruction must always be controlled by the consideration of muscle action. For example, in compound fractures associated with muscle damage it may be necessary to aim at deliberate shortening of the bone in order to secure maximum power in the muscle. Joint movement per se is not only useless, it is most disabling—for example, a flail elbow. Joint movement caused and controlled by balanced muscle action is the very essence of power.

"Progress in treatment, therefore, is not indicated or estimated by attention to the angles of joints but by the degree and strength of the contraction of the muscles controlling the joints." (Griffiths 1943.)

Thus there must be such anatomical reconstruction of injured parts as permits the muscle to act to the best mechanical advantage; an adequate blood-supply is equally important because it provides for adequate oxygenation, nutrition, and the elimination of waste, all essential in promoting repair and redevelopment. The blood-supply depends not only upon the arterial flow but equally upon a good venous return. Unless the venous return is adequate there is stagnation in the capillary circulation and a decreased blood-supply, with œdema, the œdema itself being of both the active and the passive types, leading to the matting together of tendons and muscles with fibrin and the ultimate formation of adhesions. *A deficient venous return is the most important single factor in the causation of stiff joints following injury.*

The importance of the blood-supply has long been recognised, but until Lucas-Championnière's day the importance of the venous return was not adequately stressed. An increased blood-supply to the part has been produced by various forms of heat, from blistering agents, through fomentations and radiant heat to diathermy. None of these methods, however, assists in the venous return. The venous circulation of the limbs owes little to the vis-a-tergo of the blood entering from the capillaries but is mainly dependent on the contraction of muscles which act as pumping stations, forcing the blood centrally along the veins. The completely flaccid muscle does not assist in the venous return, but when the muscle is in a state of tonus the pumping action is functioning. But this action increases proportionately to the amount of actual contraction which takes place in the body of the muscle. Bainbridge (1931) has shown that the blood circulation through a muscle at exercise is increased 4–9 times. Michell and his colleagues (quoted by Allbutt 1909) and Schneider and Havens (1915) have also shown that muscle training is followed by an increase in the red cells and in the hæmoglobin value of the blood. It follows, therefore, that the process of healing in an injured limb can be *assisted* by keeping the muscles in a state of tonus, and *hastened* by keeping the muscles at exercise.

We have thus established an endless chain: power in the limb is produced by muscle contraction; but muscle-action requires a good circulation, the first essential for tissue repair; and circulation is only made possible if the muscles contract, producing power.

THE LADDER OF POWER

The purpose of all treatment is to secure normal muscle-action; but the methods of securing this action must be the basis upon which the treatment is founded. The accompanying table is an attempt to show in simple form steps in the development of power. On the lowest rung of the ladder is the amœba, to illustrate a primitive form of power produced by the movements of an isolated cell. On the next rungs are plain and striped muscle, considered purely as tissue cells but specialised in form and function and acting in groups, producing a local concerted action with the evolution of power. In the states visualised on these three lowermost rungs of the ladder, power is only produced by the direct stimulation of the actual cell.

The next step, illustrated by the simple "muscle-nerve" preparation of the physiologist, shows the muscle with its afferent nerve intact. In this stage power may be produced by a stimulus applied to the nerve at a distance from the muscle itself. Climbing to the next rung marks a very big step upwards with the development of the simple spinal reflex. The difference between muscle contraction produced by reflex action and the contraction of muscle cells already visualised is well expressed by Starling (1936):

"A reflex achieves not the contraction of a particular muscle, but the performance of a significant movement. This always involves *groups of synergistic* muscles."

The simple spinal reflex-arc consists of a sensory end-organ from which the impulse passes via the sensory nerve and posterior-root cell across the synapse in the spinal cord to a cell in the anterior horn, from which the motor neuron passes to the muscle; but in the human being it is doubtful whether such a purely simple reflex does occur. Fearing (1930) states that "The knee jerk, and perhaps all other simple reflexes, cannot be regarded as isolated units of function in the intact nervous system." But beyond noting the fact that opinions differ among the physiologists on the nature of nerve paths involved in reflex action, I am not going to attempt to review all physiological argument with each successive step. The next stage in development from the local spinal reflex is the crossed extensor reflex involving at least the whole cord segment at the level of the stimulated anterior horn cells; and so up to the stretch reflex, described below. I hope to show that this reflex is of fundamental importance in the treatment of the injured.

If a tendon of a muscle be divided with the nerves and cord intact and then the tendon be pulled upon and stretched, the muscle will automatically contract. This stretch reflex is lost if the nerves be divided. It is the fundamental reflex in a group of reflexes which were described by Sherrington (1897) as the "postural reflexes." Postural reflexes are divided into two main classes: those which maintain the position

* Being the substance of a Hunterian lecture delivered on May 5.

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of the body while at rest, the static reflexes; and those which maintain the position of the body when in motion, the statokinetic reflexes. The static reflexes are divided into: the stance reflex of pose, and the righting reflex. All postural reflexes are dependent upon tonus, which itself is produced by the stretch reflex.

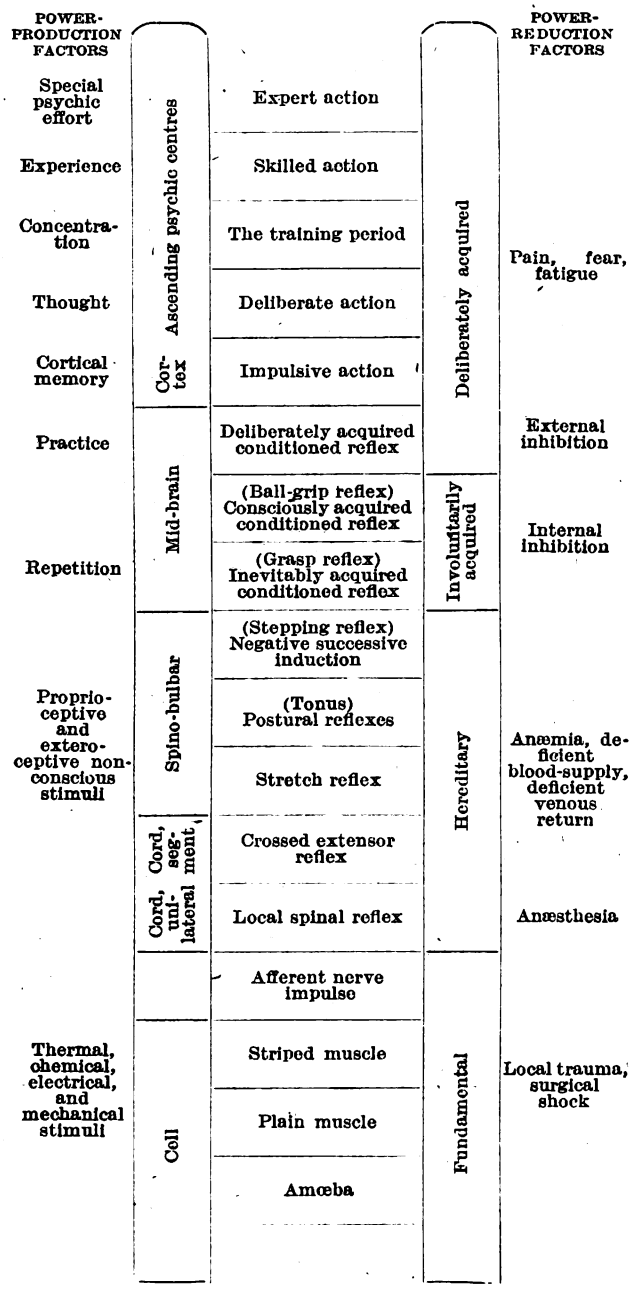
When a simple reflex such as the stretch reflex subsides, there is a tendency for an opposing movement to occur. This is called negative successive induction and is well seen in the stepping reflex. Fulton (1938) describes the phenomena in this way:

"In rhythmic reactions in which antagonistic reflexes alternate in controlling the final common path, e.g. stepping reflexes, one reflex facilitates subsequent use of the final common path by antagonistic reaction. This principle of facilitation of opposites is referred to as a successive induction."

The reflexes to which I have referred so far all take place in the spino-bulbar regions of the cord and they are all unconditioned or hereditary reflexes.

Another big step up the ladder is the development of conditioned reflexes. These may be taken successively as the inevitably acquired conditioned reflex, the consciously acquired and the deliberately acquired.

THE LADDER OF POWER



An example of the inevitably acquired reflex is the simple grasp reflex of the new-born baby, rapidly acquired as an automatic prehensive reaction. This grip is of the cylinder type and in the great majority of people soon gives place to the consciously acquired ball-grip in which the thumb is opposed.

The deliberately acquired conditioned reflex is produced by psychological effort and repetition over a long period: walking, dancing, piano-playing are three good examples. Howell (1936) explains the development of this reflex:

"In learning such movements one must, as the saying goes, establish his reflexes and the result can hardly be understood otherwise than by supposing that the continual adjustment of certain sensory impulses to certain co-ordinated movements results in the formation of a more or less complex reflex arc or set of paths of least resistance."

The summit of the reflex arc in the conditioned reflex is in the mid-brain. The next step up the ladder brings us to the cerebral cortex and to impulsive action. By that is meant action which though not a true conditioned reflex occurs automatically without the effort of conscious thought or volition and might be stated to be a reaction of cortical memory. For example, the return of the ball during a fast rally at table tennis.

Passing up to deliberate action, conscious thought for the first time becomes responsible for muscle action. The identification of further steps up the ladder of power development must be rather indefinite: training, skilled action and expert action.

With the exception of impulsive action, in all further steps up the ladder power is produced by conscious thought, and each step marks a greater degree of mental effort for the amount of actual work done; until, reaching the top of the ladder, mind becomes of paramount importance and muscle only a medium of expression; and of this I can think of no better example than the interpretation of music by a great conductor.

It will be seen that my ladder is really of the extensible type one sees in the fire-escape. The conditioned reflex is dependent for its origin upon the action of the higher centres, and it is only when those higher centres have relegated their authority to the mid-brain that the ladder can be further extended and still greater power be achieved by the higher centres.

POWER-PRODUCTION FACTORS

Turning to the activating processes producing muscle-action at different levels of our ladder of power, in the first four steps—i.e., the simple cell stages—contraction is produced by thermal, chemical, electrical or mechanical stimuli applied directly to the cell or to the motor neuron. In the second section of the ladder involving the spino-bulbar reflexes, the stimuli, still of the same character as those below, may be proprioceptive or exteroceptive, but depend upon the afferent path to the cord. The conditioned reflex adds the power-producing factor of repetition, and this in the deliberately-acquired reflex was originally the result of conscious effort. Impulsive action, although not a true acquired conditioned reflex, is produced by the cortical memory of deliberate action freed by practice from the psychological inhibitions associated with conscious deliberation. Deliberate action becomes an effort of will power or thought; but for deliberate muscle-action to be developed into a state of skilled muscle action a period of training is necessary, requring concentrated mental effort and practice, and this can only lead to the desired skilled action as experience is obtained. Finally, something more is needed before the skill becomes expert. This extra something is not only experience but represents a definite advance in pure psychical effort.

POWER-REDUCTION FACTORS

Two cardinal principles of the physiology of muscle-action are the all-or-none law of muscle contraction which may be stated as saying that no muscle cell can contract at all without producing the maximum power of which it is capable; and the fact that it is impossible to produce physiological fatigue in a muscle by stimuli which pass through a nerve synapse: in other words, fatigue occurs at the synapse and results in an effective block

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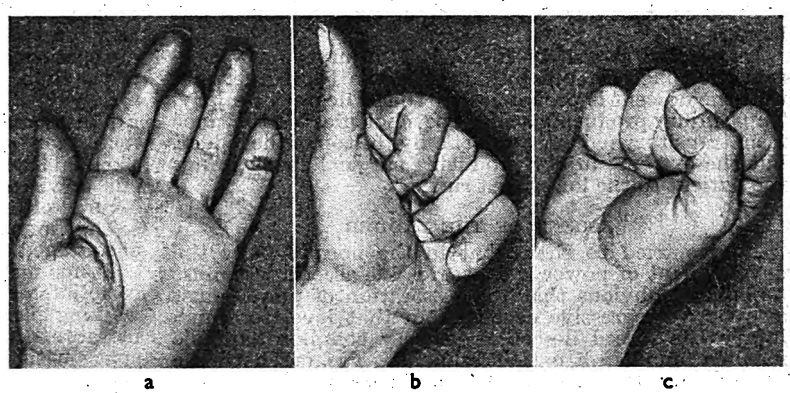
to the passage of stimuli before the muscle tissue itself is fatigued.

Power-reduction factors are those things which inhibit the power-production factors. At the top of the ladder we must look for the factors that will interfere with intense mental effort, and here we may bracket pain, fear and fatigue. Not only do these three causes act upon the topmost rungs of the ladder, but their influence is felt, although to a lesser degree, in each step down. Fatigue acts most strongly through the higher psychical centres. To refer again to our example of the conductor of music: extreme bodily fatigue amounting to physical exhaustion may be produced by the effort of conducting a piece of music, though the actual work done, estimated in foot pounds per minute, may be negligible—less perhaps than would have been done in taking a leisurely walk. In this case, therefore, loss of muscle-power must be attributed directly to fatigue occasioned by psychological effort. It is also a matter of common observation that both pain and fear will accelerate the fatigue occasioned by psychological effort. For example, working with toothache or, if you can cast your minds back to your school days, rendering an "unseen" in a state of fear that swift and painful retribution will be the reward of an indifferent effort. But both pain and fear operating as power-reduction factors do so through the psychological centres. In certain conditions both pain and fear can be stimuli to the actual increase of power, for sudden pain or fear produces a reflex or impulsive action. In these cases the increase in power is only momentary and if the pain persist loss of power inevitably follows.



a b c

(a) A hand, showing a recent injury to the little finger and an old injury to the middle finger. (b) The injured hand closed, showing the grasp reflex and inhibition of the ball grip. (c) The uninjured hand closed, showing the ball grip reflex.

The inhibition of the conditioned reflex may be either external or internal. The external inhibition is produced by some excitatory processes other than the conditioned stimuli in the central nervous system, and of these pain, the anticipation of pain or other fear, are of greatest importance. Of the internal inhibitory stimulus Fearing (1930) writes:

"When the conditioned stimulus is presented several times without a reinforcement, that is, without at the same time giving the usual unconditioned stimulus, it becomes ineffective and is an example of internal inhibition. These inhibitory effects may irradiate over the entire cerebral cortex and even the lower centres."

The conditioned reflex of industry is a very complex affair. Take, for example, the skilled carpenter using a saw. The action is one of pushing and pulling the saw, but long practice has produced a conditioned reflex in which each stroke of the saw corresponds almost exactly with the previous or succeeding strokes. The reflex developed is a nice example of negative successive induction, but it is not the simple affair of alternate contraction and relaxation of the biceps and triceps or of the serratus magnus and latissimus dorsi muscles. The beautifully balanced muscle-action involved depends upon many different conditioned stimuli.

To mention only a few of these: there are the touch stimuli from both hands. In the saw hand a definite tactile discrimination is associated with the man's own saw (as every tradesman uses his own tools). Thus the same part of the skin of his hand is stimulated every time he grips this particular saw. There is the stimulus of bone vibration set up by the wave-length of the saw being used, so that the further the saw is thrust the shorter the vibration wave, ultimately suggesting the point at which the reflex action of the thrust shall be reversed. There is in addition the sound reflex, the rasp of the saw, and here again the note alters with the progress of the saw through the wood. When the conditioned reflex is first established a knot in the wood will cause a temporary interruption in the reflex path and tend to throw the muscles out of proper coördination so that there must be a period of conscious action before reflex action is re-established. But as time goes on the extra resistance of a knot in the wood itself produces a superimposed conditioning stimulus and calls forth a bigger muscular effort without interfering with coördination.

In considering all these industrial conditioned reflexes the law of summation of conditioned reflexes must be borne in mind. This states that when different conditioned stimuli will each call forth a similar reflex, the stimuli acting together will produce a greater effect than they do when acting alone. A conditioned reflex may be reduced but not lost by interference with one of the conditioned stimuli, provided that the other conditioned stimuli are sufficiently strong to overcome the inhibiting effect of the lost stimulus. The conditioned stimulus is most easily inhibited by a similar but more powerful type of stimulus which, by occupying the same nervous path, overshadows it.

An excellent example is given by my secretary who finds that she cannot type well while a road-drill is in action. This cuts out the sound of the typewriter which is one of the most important conditioned stimuli of the reflex, and a much greater mental effort is necessary to operate the keyboard. On the other hand the road-drill does not interfere with the other parts of her work, such as calculations and accounts.

Any outside influence that interferes with or interrupts any of the conditioned stimuli interferes with rhythmical muscle action and therefore reduces power.

The power-producing effect of the hereditary reflexes is reduced in part by the fatigue occasioned by the depression of the higher centres, in part by fatigue from over-stimulation. The importance of maintaining a proper blood-supply and proper control of the circulation cannot be over-emphasised. The effect of blood-deficiency is felt even more acutely in the central nervous system than in the actual muscles themselves. A familiar example of this is the giddiness that is often experienced by untrained subjects during muscular exertion.

Not only the quality of the blood, but the amount of blood in circulation is also an essential factor in the production of muscle power. If we compare the muscle of the tame rabbit, the wild rabbit and the hare we see in the first a very pale structure, in the second pink flesh, and in the hare dark red muscle.

Ranke and Spehl (quoted by Bainbridge 1931) showed that during rest one third of the total blood is present in the skeletal muscles. It follows, therefore, that in the highly-trained individual the total blood-volume is increased, and conversely, if the blood-volume is diminished the muscles must lose power.

In addition to the total volume and quality of the blood, local interference with the circulation may produce a profound effect on loss of power, not only locally but generally. For example, if the blood-supply to a muscle be impeded, tone in that muscle is diminished and in consequence tone is diminished in the synergistic muscles, and where tone is diminished venous return is diminished, and a vicious circle is established.

Finally, the power-producing factor of the muscle tissue may be destroyed by local trauma or inhibited by direct fatigue from local stimulation or from interference with its nutrition or from the direct effects of toxic bodies. In injury this complete inhibition of muscle power is seen as a result of local trauma, extreme surgical shock, and anæsthesia.

In viewing now the power-reduction factors it is seen that all those factors which cause loss of power at the bottom of the ladder act equally at the top, whereas certain factors (e.g. pain) acting at the top of the ladder

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become increasingly less active in the descent of the ladder.

In practice it will be found that injury as a power-reduction factor represents a fall down the ladder and that the descent is proportionate to the degree of injury. Thus, injury producing a slight psychological disturbance from transitory pain may affect only the top of the ladder, but the extreme injury producing surgical shock brings the patient to the lowermost rungs.

ASCENT OF THE LADDER

I have tried to show that in the normal body the development of power is a progressive ascent. It must be equally obvious that the restoration of power must also be a progressive ascent from that level to which injury has forced descent. A very common example may be found in a patient's hands. Fig. (a) shows the open hand: the man is suffering from a recent fracture of the middle phalanx of the little finger and incidentally on some previous occasion had lost the tip of the middle finger. On being asked to close the hand (fig. b) he produces a cylinder grip which is in effect the grasp-reflex, almost the earliest acquired, inevitable conditioned reflex; the thumb is abducted and extended. Contrast the effect when the man is told to close the sound hand (fig. c): here he produces the ordinary adult grip with its consciously acquired conditioned reflex with full opposition of the thumb and flexion of the terminal phalanx. This example of external inhibition of a later grip-reflex and the substitution of the older established grasp-reflex will be found in the early stages of every case of substantial injury involving the hand or forearm.

FIVE FEARS

The aim of our efforts in treatment is the restoration of power through muscle-action, and to effect this, power-reduction factors must be removed so that power-production factors may operate. First, fear must be abolished. The workman's great fears are of pain, financial loss, unemployment, industrial de-grading, and litigation. At the Albert Dock Hospital steps are taken immediately after the patient's arrival to combat each of these five fears. The last four are eliminated by close coöperation between the hospital staff and the employers. All kinds of imaginary difficulties may be raised as to the successful working of this liaison, but after five years' experience we find that there are no insurmountable difficulties. The whole-hearted coöperation of the employers of labour in the interests of their workmen is invariably obtained. It is true that in obtaining this coöperation tact, understanding and goodwill on both sides are necessary.

Painful dressings may be performed under general or local anæsthesia or during periods of apnœa produced by deep-breathing. Pain from muscle-action can be minimised by making the action subconscious; that means, by employing the unconditioned or conditioned reflexes rather than the higher psychological processes. As an example of the maintenance of muscle-action and the conservation of power, not only in the limbs but throughout the body, let us consider the case of a recent fracture of the tibia and fibula. In the very earliest stage in treatment reflex action of the muscle may be prevented by the amount of actual tissue trauma. It is in this stage in treatment that mechanical stimulation of the part by, say, the gentlest form of massage, is useful. But at the earliest possible moment the restoration of tonus must be assisted by taking advantage of the postural reflexes.

An exercise described by McConnel (1930) may be used; it consists in pressing the feet against a fracture-board, with the ankles at right angles, and alternately raising and lowering the longitudinal arches by making an attempt at gripping the board with the feet. This action produces synergic muscle contraction in all the other muscles of the limb and of the buttock and is really a reproduction of the postural reflexes which would be set in motion if the patient were standing upright endeavouring to keep his balance on a narrow or roughened surface.

But though it is important to encourage tonus, it is still more important to guard against its inhibition. In this respect I would point to one of the commonest abuses of skeletal traction. Skeletal traction, by direct pull upon the muscle, produces a stretch-reflex and this in itself produces tonus. But if skeletal traction is prolonged, fatigue develops at the spinal cord synapse and tonus is lost, and not only lost in the individual muscles concerned but it is inhibited in the other muscles of the limb. In this way the blood-supply to the part is seriously diminished, the muscles waste with great rapidity, and I venture to say the *commonest cause of non-union of fractured bone is put into full operation.* Skeletal traction, therefore, and anchored splints must be cut down to a minimum and immobilisation of bone secured either by internal fixation or by plaster of paris so that tonus may be maintained and exercise in the limb encouraged.

Tonus may also be inhibited by the faulty application of splints or plaster. One all too frequently sees legs in walking plasters in which the plaster ends in the mid-metatarsal region, thus leaving the toes projecting into space without any support. The explanation given is that it allows freedom of movement of the toes. Actually it tends to inhibit movement by tiring the stretch reflex. In the case of the great toe the effect of gravity is such that the tendency is for the toe to drop, producing a pull upon the extensor longus hallucis and eliciting a stretch reflex with increase of tone in this muscle and the synergistic muscles. But since the pull of gravity operates continuously this stretch reflex is gradually tired and not only is tonus lost in the extensor longus hallucis, allowing the toe to drop, but tonus is inhibited in other muscles with the inevitable decrease in blood-supply to the limb. The effect upon the restoration of working capacity is twofold: (1) healing is delayed and therefore incapacity is prolonged; and (2) the new and severely disabling pathological condition of hallux rigidus is induced (Griffiths 1935).

But exercise confined to the injured limb is not enough. No muscle in the body must be allowed to get out of training. This is important not only in maintaining power, but also in preserving that sense of well-being and that happiness on which successful treatment depends.

THE CONDITIONED REFLEX IN RECOVERY

With the injured workman, bed treatment is only a minor problem. Over 99% of the injured can and should receive ambulatory treatment, and this must be designed to ensure that they use their conditioned reflexes and so secure the maximum amount of exercise with the minimum amount of fatigue. Man's ordinary walking gait is a combination of postural reflexes with the stepping reflex and various conditioned reflexes, not the least of which is produced by the sensation of the impact of the ground *transmitted through the sole of a shoe or boot.* The walking reflex in bare feet is somewhat different from that in thick boots, but in both cases the law of negative successive induction applies. If a boot is worn on one foot and a felt slipper is worn on the other there is direct interference with this conditioned reflex and unnatural action is produced: walking becomes a conscious effort instead of a subconscious progression. Treatment, therefore, must be aimed at restoring normal walking conditions at the earliest possible moment.

Take, for example, the treatment of the fractured terminal phalanx of the great toe, which is the commonest fracture in industry—found in 1935 to produce an average period of incapacity of some 18 weeks (Griffiths 1935). This incapacity is due to pain, swelling and awkward gait. But if the treatment is designed to restore the patient to his working boots at the earliest possible moment the period of incapacity can be materially reduced. First, pain must be stopped and the nail saved. This is done by trephining a small hole in the nail and relieving pressure on the nail bed. Second, swelling is prevented by putting the patient to bed with the foot elevated for 24–48 hours. At the end of that time, if the skin is broken a light support of the collodion type may be applied over a soft-paraffin dressing, but the whole must not be sufficiently thick to prevent the patient getting his foot into his ordinary working boot. The sole of the boot acts as an excellent ventral splint and the nail as a dorsal splint, and the patient is able to walk with complete freedom from pain, and save in quite exceptional cases he is able to return to work within a week.

Again, in treatment by exercise care must be taken not to attempt to develop a new reflex in an injured limb before the normal fundamental and conditioned reflexes have been properly re-established. In other words, it is

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wrong to start treatment at a level on the ladder higher than that to which the patient has fallen.

For instance, in treating injuries associated with loss of movement in the ankle-joint, it is common practice to see patients employed upon treadle-machines, working lathes or looms, or some similar apparatus. The treadle-action of the foot is entirely different from the walking reflex and before it can become automatic paths of reflex action have to be established which tend to interfere with the well established stepping reflex. The tendency, therefore, is to inhibit the return of the normal walking reflex which is essential to complete recovery. But in addition to this interference, the exercise is badly chosen because it involves the top section of the ladder and must produce fatigue at an earlier stage than would have been the case if a well-established walking reflex had been used to produce the desired movement. I invite you to try the action now of forcibly raising and lowering the ankle of one foot as in working a treadle. Before you have done it half a dozen times you will become conscious of the strain in the muscles of the front of the leg: it would probably have taken you many hours of walking to get this same effect.

Almost as simple to use as the conditioned reflex in the training and development of muscle will be found impulsive movement, and perhaps this is easier to develop in men by the use of ball exercises than in any other way. Catching a fast-moving ball is generally impulsive action. An exercise which I find particularly valuable in restoring the power of upward movement of the arm at the shoulder is to instruct a group of men to bounce a football on the floor of the gymnasium hard enough to reach the ceiling. This is not easily done, and it will be found that with the patient's attention directed on the downward movement the arm is raised higher and higher by impulsive action.

Finally, we come to the question of vocational exercise associated with the patient's work. This aspect of treatment must only be attempted when its practice will not produce any of those factors which inhibit the conditioned reflexes which are the foundation of his skill.

As an example take the carpenter who has an injured wrist and is asked to use a screwdriver. The normal action of driving a screw is for him a conditioned reflex, but pain inhibits this reflex action and it does so in this way. In the first turn made perhaps the normal conditioned reflex was obtained, but with it pain; the movement now becomes a conscious movement and the anticipation of pain produces a static contraction of muscle to resist the anticipated movement and this inhibits the conditioned reflex with resultant incoördination of muscle action and loss of power. But the effect does not end there. With pain and work linked in the man's mind, fear is born—the fear of incapacity for work—and this fear still further inhibits the conditioned reflex. It has been a mistake, therefore, to attempt to restore the conditioned reflex of the man until the arm has become relatively free from those factors of pain and stiffness which would inevitably inhibit the desired action. Once full and painless movement has been restored by diversional exercises the conditioned reflex of normal work may be used in muscle development, but even then it must be remembered that it should never be continued to the length of producing fatigue.

What has been said of vocational therapy applies equally to so-called "light work." The light work clause was introduced into workmen's compensation legislation in the hope that it would assist in rehabilitating the injured man. That its effect has been the reverse is due to the fact that the principles which I have been endeavouring to define have not been followed out. The man has been given work of a lighter character in his own trade before he is sufficiently free from pain and while still liable to early fatigue. As a result he develops inhibition of his previously work-conditioned reflexes, leading to increased clumsiness and to despondency. If he has not been employed at the lighter forms of his old job, all too often he has been given work which involves industrial de-grading—a bricklayer becomes a tea-boy—and one of his worst fears is realised. His mind now becomes so concentrated upon the injured part that subconscious movement becomes almost impossible and the most rapid road to recovery—restoration through exercise—is barred to him.

Light work may play a part in rehabilitation: (1) if it is divorced entirely from the man's original work; (2) if it is interesting and does not involve any conscious effort with the injured part or cut across any of the fundamental or acquired conditioned reflexes; (3) if it does not cause local or general fatigue; and (4) if it be prescribed only for a strictly limited number of days.

SUMMARY

Injury precipitates a man down the ladder of power. The surgeon, taking the man at the level at which he finds him, must help him step by step upwards to full rehabilitation.

The aim of treatment is to restore power, not only to the injured part but to the whole body. The restoration of power can only be achieved by exercise which in turn produces a flow of "more and better" blood and hastens tissue repair. But the flow of blood must be regular and not in fits and starts, so that exercise must be prolonged throughout the hours of the ordinary working day instead of for half an hour three times a week.

In order to make such exercise possible without inducing fatigue, the exercises should be based upon established reflex action: at first the fundamental reflexes, then the conditioned reflexes, and finally impulsive action.

In the patient psychological effort must be reduced to a minimum because this effort produces fatigue at a stage much earlier than it would otherwise occur. Normality (i.e. the use of conditioned reflexes) must be encouraged. Normal working boots should be worn and sticks and crutches disallowed. Bad habits of grasp and grip and gait are prevented or corrected by leading the patient back step by step up through his reflexes.

All this requires great psychological effort, but this effort must be made by the surgeon on behalf of his patients; and for him, like them, "getting fit is a whole-time job."

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PEPTIC ULCER

PROGNOSIS IN ROYAL AIR FORCE PATIENTS

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AIR-COMMODORE AND CONSULTANT IN MEDICINE IN THE RAF

MUCH has been written since the beginning of the war about indigestion in Service personnel and a review of this published work has recently been made by Dunn (1942). Figures have been given to show the incidence of indigestion among patients admitted to various hospitals, although it is unlikely that the general incidence will be known until after the war, owing to the fact that the strengths of units and formations are secret. So far as the Royal Air Force is concerned it has been reported that the incidence of indigestion in members of aircrew is higher than in ground personnel, and that the invaliding rate, since the outbreak of war, on account of digestive disorders has been about 17% of those discharged for all diseases.

In civil life, despite the large number of men and women who suffer from peptic ulceration, comparatively few appear to be chronic invalids and most manage to carry on, some probably settling into sheltered occupations. In contradistinction to this it seems to be generally agreed that peptic ulceration is a bar to service in the armed forces (Crohn 1941, Chamberlain 1942), and according to Hinds Howell (1942) in all three British Services most cases of proved ulceration have been invalided, a minority only returning to duty after a course of treatment. The proportion of cases returning to duty is probably largest in the RAF: firstly, because the proportion of skilled technicians is high and every attempt is made to keep valuable men; secondly, because the opportunity of placing these men in sheltered appointments and even allowing them to live in their own homes is greater in the RAF than in the

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other Services. It was hence felt that an inquiry into the after-histories of patients with peptic ulceration who had returned to duty might be of value as a guide to future procedure.

DISPOSAL IN THE RAF

Though peptic ulceration was a common condition in the wards of RAF hospitals before the war (just 100 cases with this diagnosis passing through one RAF hospital in the two years 1937–38), it was not a major problem as regards flying personnel because of the care with which they were selected. A history suggestive of peptic ulceration, or of recurring indigestion, has long been a cause for rejection of candidates for flying duties because the stress of flying has been found so often to lead to recurrence of symptoms.

In the yearly report on the health of the Royal Air Force, last issued in 1937, peptic ulceration was not treated separately but was included under the heading of "other diseases of the digestive system." It is, therefore, not possible to state exactly how many officers and men were invalided for peptic ulceration under peace-time conditions, but in the 5 years 1933–37 it was not more, and may have been rather less, than 32 out of a yearly strength averaging just over 40,000. Under a heading which included all diseases of the digestive system only 39 were invalided in the 5-year period, just over 3% of those discharged for all diseases, the rate varying but little from year to year and showing no tendency to rise. Since the war this figure has risen to 17%.

The methods of disposal of cases of peptic ulceration in the RAF were formulated before the onset of the war. They have stood the test of time and, substantially unaltered, are still in use.

The men of prime importance in the RAF are the pilots and the other members of aircrew. Their training is long and expensive and their care and the maintenance of their physical efficiency is the first duty of the RAF Medical Service. While the value to the Service of the trained airman may not be so great as that of a pilot, the importance of conserving technicians cannot be overestimated, and every attempt is made to prevent these men from being invalided. The unskilled or untrained airman with symptoms of peptic ulceration is often better in civil life.

TABLE I—TO SHOW DIAGNOSIS, RANK, AGE-GROUPING, DURATION OF SYMPTOMS AND PRINCIPAL CRITERION OF DIAGNOSIS IN 41 OFFICERS AND 153 AIRMEN (194 CASES)

		Officers		Airmen	
		No.	%	No.	%
Diagnosis	Duodenal ulcer	33	80	114	74·4
	Gastric ulcer	4	10	32	21
	Peptic ulcer	4	10	6	4
	Gastric and duodenal ulcer	..	..	1	0·6
Rank—					
Officers	*Airmen*				
A/Commodore	W/Officer	1	2	4	3
Group Captain	F/Sergeant	2	5	8	5
Wing Commander	Sergeant	2	5	15	10
Squadron Leader	Corporal	7	17	23	15
Flight Lieutenant	Leading A.C.	8	20	27	18
Flying Officer	Aircraftman	12	29	76	49
Pilot Officer		9	22	..	..
Age in years	20 or less	..	..	10	7
	21–25	5	12	23	15
	26–30	11	27	40	26
	31–35	4	10	28	18
	36–40	3	7	32	21
	Over 40	18	44	20	13
Duration of symptoms	Nil	3	7	7	5
	1–28 days	5	12	9	6
	1–12 months	..	..	22	14
	1– 5 years	15	37	63	41
	6–10	12	29	29	19
	Over 10 years	6	15	18	12
	Doubtful	..	..	5	3
Criteria of diagnosis	(*a*) X-ray evidence—				
	Crater	11	27	38	25
	Deformity	17	41	65	42·4
	(*b*) Perforation	3	7	38	25
	Hæmatemesis	6	15	11	7
	Melæna	4	10	1	0·6

In the case of pilots with peptic ulceration return to flying is gradual and many months, with complete freedom from symptoms, must elapse before a full flying category can be regained. In peace-time, after a full course of treatment and convalescence, the patient was kept on ground duty usually for 9 months. After this period, which was nearly a year from the original illness, limited flying was allowed, the limitations usually being for height and duration of flight. A ceiling of 8000 feet and flights of not more than 2 hours' duration were the limitations usually imposed, although there was often variation in individual cases. After a further 6–12 months the position was again reassessed and if symptoms were absent with few dietetic restrictions, a full flying category was usually allowed, but overseas service was still prohibited. These cases tend to break down in hot climates and a period of freedom from all symptoms, usually for about 4 years, has been insisted upon before passing for overseas service. Since the war these periods have been cut down to some extent in cases which have reacted well to treatment, but in every instance a gradual return to flying duty is recommended.

TABLE II—TO SHOW POSITION IN THE AUTUMN OF 1942, ABOUT 2 YEARS AFTER ORIGINAL DECISION TO RETAIN THE OFFICER OR AIRMAN IN THE SERVICE

—	No.	Full medical category		Home service				Invalided	
				Temp.		Perm.			
		No.	%	No.	%	No.	%	No.	%
Officers	41	5	12	17	41	19	47	0	..
Airmen		Still serving		Discharged on grounds other than ill-health				Invalided	
		No.	%	No.		%		No.	%
Warrant officers and N.C.O.s	50	42	84	0		..		8	16
Leading aircraftmen	27	16	60	2		7		9	33
Aircraftmen	76	32	42	3		4		41	54
Total airmen	153	90	59	5		3		58	38
Officers and airmen: Total	194	131	67	5		3		58	30

Air-gunners, air-observers and other non-piloting members of aircrew are dealt with on similar lines, with a tendency to return earlier to flying duties.

The policy of conservation of trained personnel must be remembered when studying the prognosis of these cases for it makes the outlook of those of higher rank and longer service appear more favourable than it really is. In any survey of the after-histories of cases of peptic ulcer in the Service it must not be assumed that valuable personnel who remain uninvalided have done better from a medical point of view than others of less importance who have been invalided for similar disabilities. It is easier for those of higher rank—such as sergeants and above—to control their diets or to obtain rest if symptoms appear, for their work is usually of a supervisory or sedentary nature. The aircraftman has no such advantage.

On discharge from hospital all patients who have been under treatment for peptic ulceration are given instructions as to their diet and future regime, but only those who want to stay in the Service will make a real attempt to regulate their life so that they can carry on. It is never worth while attempting to retain a patient who has had definite peptic ulceration and who wants to return to civil life. As a consequence those who are retained have usually a high sense of duty and good morale. Many people have suggested the formation of companies or units in which men suffering from chronic indigestion could be collected and given special dietetic facilities. An attempt to do this on a small scale in the RAF met with administrative and other difficulties and was abandoned. To make a success of such a scheme the airmen chosen would have to be psychologically of the best type, for it is doubtful if any amount of special dieting or medical supervision will offset the foolishness of a man who will not look after his own health.

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TABLE III—COMPARISON OF PRINCIPAL FEATURES IN DIAGNOSIS AND HISTORY OF AIRMEN WHO ARE STILL SERVING AND THOSE WHO HAVE BEEN INVALIDED

—		Still serving			Invalided		
Total—airmen only		90			58		
		No.	%		No.	%	
Diagnosis	Duodenal ulcer	67	74		43	74	
	Gastric ulcer	17	19		14	24	
	Peptic ulcer	5	6		..	..	
	Pyloric ulcer	..	..		1	2	
	Duodenal and gastric ulcer	1	1		..	..	
Age in years	20 or less	5	6	42	4	7	53
	21–25	10	11		10	17	
	26–30	23	25		17	29	
	31–35	19	21	58	9	16	47
	36–40	22	24		10	17	
	Over 40	11	13		8	14	
Duration of symptoms	Nil	3	3		4	7	
	1–28 days	7	8		2	3	
	1–12 months	12	13		8	14	
	1– 5 years	34	38		28	48	
	6–10 ,,	21	24		11	19	
	Over 10 years	9	10		4	7	
	Doubtful	4	4		1	2	
Criteria of diagnosis	(*a*) X-ray evidence—						
	Crater	24	27		12	21	
	Deformity	36	40		27	46	
	(*b*) Perforation	22	24		15	26	
	Hæmatemesis	7	8		4	7	
	Melæna	1	1		..	..	

CLINICAL MATERIAL

The medical records of over 1300 cases, diagnosed as peptic ulceration and reported during the first 18 months of the war, have been examined. Many of these cases were invalided but a number were retained. The case-histories of all officers and men who were retained were scrutinised and all those in which the diagnosis seemed reasonably certain were selected for special study. They formed a group of 194 officers and airmen—a very selective group, so that no attempt has been made to draw conclusions as to the incidence of peptic ulceration, either in general or in any particular section, in the analysis which follows. Guidance in disposing of patients with peptic ulceration has been the sole aim.

Certain factors which tended to make for selective sampling must be mentioned. In the first place the medical officers who gave the original decision, that it was worth while trying to retain a patient in the Service, must have chosen the better type of man who had reacted well to treatment. Secondly, when examining the histories and selecting the cases to be followed up an attempt was made, so far as possible, to ensure that diagnosis was correct. This inevitably meant that patients who had suffered from one of the easily recognised complications of ulceration would be included, as the diagnosis was then almost certain. As a result the incidence of complications in the group is higher than it should be in a fair sample. This has probably given a too favourable picture as a number of these patients had few symptoms of indigestion and as soon as the complication had been treated they were again symptomless.

In a few instances, when studying the original medical history records, some of the subsequent history was known and may have biased the decision as to whether or not the case should be included in the group. It is not thought, however, that this has caused any serious vitiation of the sample.

DIAGNOSIS

One of the difficulties immediately encountered in any inquiry relating to peptic ulceration is what criteria of diagnosis are to be laid down. The standards acceptable at a special gastric centre cannot be reached at the ordinary hospital. Many cases are diagnosed as gastric or duodenal ulceration by station medical officers on symptoms alone, and possibly never reach hospital for X-ray examination.

While symptoms may often be typical it is doubtful if an accurate diagnosis can be made on them in the absence of complications without some method of confirmation. Too much reliance can, however, be placed on X-ray evidence and when studying the case-histories of these patients one is struck by the inconsistency of the X-ray reports. In one instance a patient was examined on two separate occasions by different radiologists, both of whom diagnosed duodenal ulceration. At operation, shortly after the second X-ray examination, the duodenum was found to be normal with no evidence of scarring. It has thus been difficult to ensure that all cases had actual ulceration, especially as the radiological reports came from different hospitals, with different radiologists of varying competence and varying standards.

In every case the symptoms were considered by the medical officer in charge of the patient to point to peptic ulceration. Where complications were absent, a barium meal had always been done and the radiologist, either as the result of finding a niche or a crater, or because of deformity tender on palpation, had indicated that ulceration was likely. When there appeared to be doubt as to the diagnosis the case was not included in the series. In tables I and III the principal criteria on which the diagnosis was based have been indicated.

ANALYSIS OF CASES

Some of the headings in the tables, such as rank, age and branch or trade, are given solely to show the distribution within the group, for as the total number at risk is unknown and as they are a selected group it is useless to attempt to draw conclusions from the figures.

After approximately 2 years all the officers were still serving though only 5 (12%) have regained their full category (table II). Nearly half have been made permanently unfit for service overseas. In the case of airmen, at the end of the period nearly three-fifths were still serving and about two-fifths have been invalided. The higher the rank of the airman the more likely was he to be able to carry on satisfactorily for reasons already discussed. Thus four-fifths of the non-commissioned officers were still serving, but for aircraftmen the figure is less than half; 4 airmen were released from Service for reasons other than ill health and 1 was killed.

The proportion of duodenal to gastric ulcers is a little over 4 to 1. This is a rather lower figure than is given by Wade (1942) for Royal Navy patients or by most of the authors quoted by him, whose figures for Service patients average 5 to 1. It is, however, higher than the figures given by either Hutchison (1941) or Hinds Howell (1942) who give ratios of 3 to 1 and 2·5 to 1 respectively. In the group studied, so far as this proportion is concerned, the sample appears to be a fair one.

The higher age-incidence of the officers as compared with the airmen is almost certainly a reflection of the greater proportion of officers in the higher age-groups. The diagnoses accepted by the invaliding medical boards were: duodenal ulcer, 43; gastric ulcer, 8; peptic ulcer, 2; and duodenitis, chronic dyspepsia, pernicious anæmia, schizophrenia and psychopathic personality, 1 each.

RETURN TO FLYING

Of the 194 cases 26 were members of aircrew, 22 officers and 4 airmen (pilots, 23; observers, 1; air-gunners, 2). Diagnosis: duodenal ulcer, 20 (77%); gastric ulcer, 6 (23%).

Flying category in the autumn of 1942

Full flying—	
(*a*) at home and abroad	5
(*b*) at home only	4
Limited flying	5
Temporarily unfit for flying	4
Permanently unfit for flying	8

Of the 26 members of aircrew included in the series none has been invalided. After roughly 2 years about half have got back to some form of flying duty, 9 of them having regained the full flying category. It would thus appear that the policy of giving adequate treatment and a really good chance to resume duty has been fully justified. The great preponderance of pilots is to some extent explained by the fact that at the beginning of the war the number of aircrew other than

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pilots was relatively small, though the exact proportion cannot be given.

One officer perforated a gastric ulcer while flying alone, managed to land safely and after treatment returned again to flying duties.

There is no evidence in the group studied that perforation or the other acute complications are more frequent in aircrew than in ground personnel.

Perforations

Aircrew	5 in 26 cases (19%)
All ground personnel	36 in 168 cases (21%)
Ground personnel*	16 in 71 cases (23%)

All complications

Aircrew	9 in 26 cases (35%)
All ground personnel	54 in 168 cases (32%)
Ground personnel*	23 in 71 cases (32%)

* Age 30 or below

INDICATIONS FOR INVALIDING

Although the figures are too small for any but the most tentative conclusions, it was thought that a comparison of the case-histories of the airmen still serving and those who had to be invalided might give some indication of the type of patient unsuitable for retention in the Service (table III).

In giving a prognosis in a case of peptic ulceration it is often considered that youth and short duration of symptoms are a good omen. The figures for the invalids, few though they be, do not bear out these opinions. Actually, in the younger age-groups—up to 30 years—a greater percentage occurs in the invalided group (53%) than in the serving group (42%), suggesting that the older men are more likely to carry on than the younger. This premise must not, however, be accepted too literally, for the older age-group contains more non-commissioned officers and skilled tradesmen who have better opportunity to control their diet and who are guarded so far as possible from invaliding because of their great value to the Service.

It seems that previous duration of symptoms has little effect on the ability of a patient to return to Service life and that none of the various criteria of diagnosis is of help in disposing of the case after treatment.

SUMMARY

The fate, as regards service in the RAF, of 194 cases of peptic ulceration allowed to return to duty has been followed for about 2 years. After this time just two-thirds of the group were still serving and about a third had been invalided.

About half of those patients who were members of aircrew returned to flying duties.

In this group of cases, selected as being worthy of retention in the Service, the subsequent history suggests that help in disposal may be obtained from the rank, for the higher the rank the more likely the patient to be able to carry on.

Neither the length of history nor any of the various criteria of diagnosis appears to offer any guidance as to whether or not an airman, after treatment for peptic ulceration, is likely to withstand Service life.

I wish to thank Air Marshal Sir Harold Whittingham, Director-General, Royal Air Force Medical Service, for making the medical history records available for study, and Dr. A. Bradford Hill for advice with the statistical analysis.

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INSTITUTE OF CHEMISTRY.—At 6 PM on Wednesday, June 16, at 30, Russell Square, London, W.C.1, Mr. W. T. J. Morgan, D Sc, reader in biochemistry in the University of London at the Lister Institute, will address the London and South Eastern counties section of the institute on some recent advances in immunochemistry.

SLIDE-TEST FOR COAGULASE-POSITIVE STAPHYLOCOCCI

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THE examination of plate cultures for coagulase-positive staphylococci necessitates the cultivation of suspected colonies in broth, and a coagulase test on the resulting broth culture, both time-consuming procedures. Much (1908) first noted that if an attempt was made to suspend coagulase-positive staphylococci in plasma, the cocci were rapidly clumped. Birch-Hirschfeld (1934) found that thick suspensions of over 100 strains of coagulase-positive staphylococci were all rapidly clumped in human plasma. She records no tests with coagulase-negative cocci. The phenomenon resembles specific agglutination, and has been called non-specific agglutination by some workers. However, to avoid all possible confusion with the established specific slide agglutination test first developed for the staphylococci by Cowan (1939) the term "clumping" is to be preferred as a description of the reaction. The relation of the clumping to the presence of staphylocoagulase is not fully clear, but if there was complete correlation between the results of coagulase tests and of plasma-clumping tests, the clumping test, which can be performed in less than a minute, would save much time in the identification of potentially pathogenic staphylococci. The evaluation of this reaction as a test for the rapid identification of *Staph. pyogenes* was started by one of us (B. C.-G.) and it will be convenient to discuss the results of this investigation first.

SERIES I

The clumping test is simple. The suspected colony is emulsified in a drop of water on a slide, and the emulsion gently mixed with a drop of plasma. Coagulase-positive staphylococci—i.e., the *Staph. pyogenes* of Cruickshank (1937)—are precipitated after 5–15 seconds in the form of easily visible white clumps. With other species of cocci, the suspension remains uniformly turbid.

TABLE I—COMPARISON OF PLASMA CLUMPING AND PLASMA COAGULASE TESTS ON STAPHYLOCOCCI FROM HUMAN SOURCES

Source	No. of strains	Positive test		Negative test	
		Slide	Tube	Slide	Tube
Eye	80	42	42	38	38
Nose	55	53	53	2	2
Tuberculous sinuses	97	91	91	6	6
Miscellaneous conditions	85	74	74	11	11
Urine	125	20	22	105	103
Total	442	280	282	162	160

Fresh human plasma from sedimentation-rate blood specimens was available each day, so that the risk of false positives with older plasma (Christie and Keogh 1940) was avoided. Parallel coagulase tests were made by mixing equal volumes of plasma and of an 18-hour broth culture of the organism in a small tube, and reading the result after 4 and 24 hours incubation at 37° C. Each batch of plasma was tested with a known positive and known negative staphylococcus. The parallelism of the two tests with 442 strains of staphylococci from pathological sources is shown in table I. Two strains only, grown from urine, were feebly positive in the tube test, and negative on the slide. In the remaining 440, of which 280 were *Staph. pyogenes*, correspondence is complete. These results were obtained after a year's preliminary trial, and illustrate the dependability of the technique in the hands of one practised observer.

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Effect of plasma on other organisms.—No clumping occurred with plate growths of *Staph. citreus*, *Bact. coli*, *Oïdium albicans*, *B. anthracoides* or *C. diphtheriæ*, all of which formed a uniform suspension in the plasma. *Neisseria catarrhalis* and two strains of micrococci investigated could not be suspended homogeneously either in plasma or in saline, and clumped in the plasma.

Of the 400 specimens of fresh human plasma used, none failed to give the slide agglutination test with the control *Staph. pyogenes* and none gave it with the control *Staph. albus*. Dilutions of plasma in normal saline up to about 1/80 were found to give a good agglutination test and a good parallel coagulase test.

Tests with fibrinogen.—Solutions of fibrinogen can replace plasma in both slide and tube test. Fibrinogen was precipitated from fresh citrated plasma by mixing it with an equal volume of a saturated solution of common salt and the precipitate, after spinning, taken up in 5 times its volume of water. This solution, containing fibrinogen and NaCl, gave both a good slide clumping and a good coagulase reaction. Fifty strains each of *Staph. pyogenes* and *Staph. albus* were tested, in parallel with plasma, by both slide and tube method ; the correlation between the two sets of results was complete, all being positive with the *pyogenes* and negative with the *albus*. The preparation was effective in dilution up to 1/160 for both tests.

TABLE II—COAGULASE TESTS IN 1/25 PLASMA BROTH AND 1/5 PLASMA SALINE ; COLONY INOCULATED DIRECT

..	Plasma saline +	Plasma saline −	Totals
Plasma broth + ..	161	53	214
Plasma broth − ..	1	82	83
Totals ..	162	135	297

SERIES II

A second series of tests was made by 3 workers on plate cultures from wound and nasal swabs. The coagulase test consisted of the inoculation of a small part of the colony into broth containing 1/25 human citrated plasma, a method devised by Mr. E. P. Murrell; the result was read after 2, 6 and 24 hours' incubation.

Plasma broth was preferred to plasma saline for direct inoculation of the colony into a test medium, for in a series of parallel tests on 297 strains of staphylococci it proved more sensitive. The broth contained 1/25, the saline 1/5 plasma. Table II shows the results. Whereas 214 strains were positive in the plasma broth, only 161 were positive in the plasma saline ; and of the 83 negative in plasma broth, one only was positive in plasma saline.

The slide test was made by rubbing the remainder of the colony in a loopful of water on the slide, and mixing the resulting suspension with a loopful of plasma. Marked clumping within 5–20 seconds was regarded as positive ; any degree of granularity after 20 seconds up to 1 minute as late positive, granularity after 1 minute as doubtful and no change after 3–4 minutes as negative.

Table III summarises parallel tests on 860 strains, 558 of which were coagulase-positive by the tube test. It will be seen at once that the late and doubtful positive reactions on the slide are not safe indicators of *Staph. pyogenes*. But if we classify these as negative, then a positive slide test indicates 87% of the *Staph. pyogenes* isolated (492/558). On this basis there were 3 wrong indications of *Staph. pyogenes* among the coagulase-negative strains. These occurred early in the series of tests, and unfortunately the strains were not saved for investigation. Five other strains which were slide-positive, tube-negative proved on re-investigation with fresh plasma to be slide-positive, tube-positive, and we have no reason to suppose that the three strains were not feeble coagulase producers of this type. In the last 500 tests of this series, when we had defined the conditions more rigorously, we found no slide-positive, tube-negative strains. The results are not clear cut like those in table I, but we present them as an example of the test applied as a routine by three independent workers in one laboratory. The occurrence of 3 auto-agglutinable strains makes it desirable that the colonies should be suspended in a separate drop of water before mixing with plasma. If the cocci are rubbed directly into the plasma, auto-agglutinable coagulase-negative strains will be classed as slide-positive.

TABLE III—COMPARISON OF PLASMA CLUMPING TESTS AND PLASMA COAGULASE TESTS ON STAPHYLOCOCCI FROM WOUNDS AND NASAL CAVITIES (860 STRAINS, 558 OF WHICH WERE COAGULASE-POSITIVE BY THE TUBE TEST)

Slide result	Coagulase-positive		Coagulase-negative
Positive	492		3
Late positive	16	66	1
Doubtful	1		5
Auto-agglutinable ..	1		2
Negative	48		291

The speed of clumping, even with strongly positive staphylococci, depends mainly on the concentration of cocci in the drop. In one test the addition of an equal volume of plasma to suspensions equivalent in opacity to 100×10^9 *Bact. coli* per c.cm. caused an almost immediate precipitation of the cocci. Dilution of the suspension to 50×10^9 increased the clumping time to 40 seconds. Below this concentration the results would be classified as doubtful. The speed is increased if a quarter-volume of plasma is mixed with one volume of suspension.

We suggest the following routine for the examination of plate cultures for *Staph. pyogenes*.

Place a clean slide and a clean, grease-free slide side by side, and put a drop of water on each with a 2 mm. loop. Rub the suspected colony into the first drop, with a minimum of spreading, and when the suspension is homogeneous, transfer the wet loop to the other drop (on the grease-free slide) and spread it into a thin film for staining. The amount of growth picked off should be large enough, or the volume of the water should be small enough to produce in the first drop a watery suspension equivalent in opacity to at least 100×10^9 *Bact. coli* per c.cm. Mix a 1 mm. loopful of fresh human plasma into the first drop, keeping up a circular motion, 3–5 per second, for 10 seconds. If clumping occurs, then a presumptive diagnosis of *Staph. pyogenes* may be made, confirmed by the appearance of the stained smear. If no clumping occurs, and the stained smear shows gram-positive cocci, a broth is inoculated for a tube coagulase test by one of the accepted techniques. Though late clumping is suggestive, it must on no account be used as basis of identification.

If proper attention is paid to three factors—the employment of fresh plasma, and of a concentrated suspension of the coccal colony ; and the rejection of all but definite, rapid clumping as indication of a positive reaction, it is possible to make correct presumptive diagnoses of *Staph. pyogenes* on at least 9 out of 10 occasions. On the tenth occasion the slide test will give a negative result with a true *Staph. pyogenes*. Since about 65% of suspected *Staph. pyogenes* colonies in routine bacteriological practice turn out to be coagulase-positive, the institution of a presumptive slide test will reduce the number of tube coagulase tests required by about 40%. The slide test is particularly useful where large surveys for carriers of *Staph. pyogenes* are being made. We do not recommend that the technique described should be adopted without an extensive preliminary trial by each observer of the two methods in parallel, until he is satisfied that all slide-positive strains are tube-positive. This stage is readily reached. Strong, clear-cut slide positives can be elicited from most of the difficult 10% of *Staph. pyogenes* strains after further experience, with results similar to those displayed in table I.

SUMMARY

The clumping of thick suspensions of coagulase-positive staphylococci by human citrated plasma may be made the basis of slide-tests for a rapid presumptive identification of potentially pathogenic *Staph. pyogenes* (*aureus*). By a carefully defined technique, at least 9 of every 10 strains of *Staph. pyogenes* that prove by the orthodox tube test to be coagulase-positive may be detected by the slide-test. The number of coagulase-positive strains missed by the slide-test is small in the

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hands of experienced workers; but all slide-negative strains of staphylococci must be tested by the tube method. Coagulase-negative strains do not give positive slide reactions.

The slide test is particularly useful for presumptive identification, and in large-scale bacteriological surveys for *Staph. pyogenes*, where the number of tube coagulase tests required may be reduced by more than 50%. The method should not be adopted without making a preliminary series of tests in parallel with the tube coagulase-test.

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INFILTRATOR FOR REGIONAL ANALGESIA

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ANÆSTHETIST TO THE EMS

THE advantages of regional analgesia are well known, but under conditions of modern warfare its application is handicapped by the amount of equipment needing sterilisation, and the difficulty of excluding contamination by dust and insects. The modern tendency to use large amounts of dilute analgesic solutions, as in the Vishnevski technique, renders regional analgesia arduous and time-consuming with an ordinary record syringe; and even if a continuous-flow syringe that will stand up to hard usage could be obtained, it would still require time and energy.

Since Matas devised a pressure infiltrating apparatus 40 years ago, various types of infiltrators have been designed; but none have proved satisfactory for routine use, and none are robust enough for use in the field. The apparatus described here has been designed in such a way that its component parts are all adapted from industrial equipment still being manufactured in quantity today. The parts from which it is made have already stood the trial of many years use in garage, workshop and chemical manufacturing plants.

The construction of the infiltrator and its method of working are as follows.

Compressed air, which may be obtained from an ordinary motor-car pump (fig. 1) passes by means of a Schrader connexion into a modified filter (as used for filtering compressed-air to operate pneumatic tools) which removes any minute particles of dust, &c. The air then passes into an ordinary two-gallon pressure chamber such as that normally used in commercial paint-spraying, and exerts pressure (50 lb. per sq. in. is the usual working pressure) on the analgesic solution contained in a stainless steel inset; the solution is forced up a stainless steel pipe into a non-ferrous air-trap which remains shut until the analgesic solution is exhausted; then the trap opens and releases the compressed air—thus definitely preventing any chance that air will be accidentally injected into the patient. The solution, on leaving the trap, passes along the flexible rubber hose to a pistol grip control adapted from an ordinary

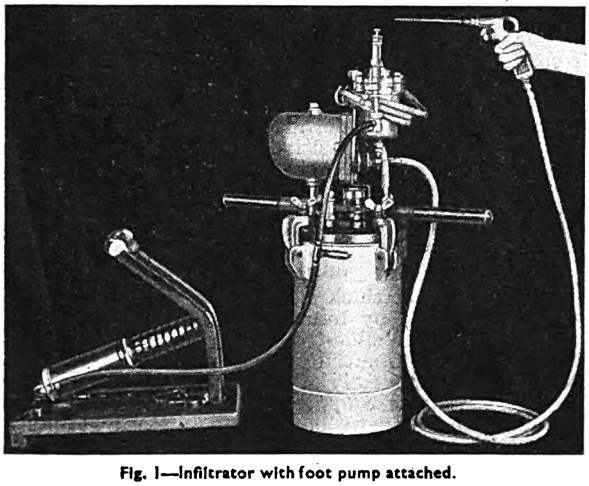

Fig. 1—Infiltrator with foot pump attached.

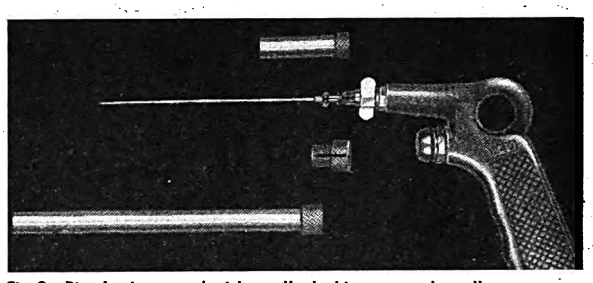

Fig. 2—Pistol-grip control with needle, locking cap, and needle protectors (short and long).

BEN blow-gun (fig. 2). The needle is attached to the record mounting but if it is of a type that does not fit firmly under pressure it may be retained by a "locking-cap." The soft-metal hub of the Arnold type of stainless-steel needle however fits firmly enough when placed on the record mount by a twisting movement. The record nozzle is protected when not in use by a cylindrical cap, but if the needle is left in position it may be protected by a specially long cylindrical cap (fig. 2).

When an aspiration test has to be done—in splanchnic block, for example—a small injector operated by the pressure of the analgesic solution is attached to the pistol grip by means of a wing-nut after the record mount has been removed (fig. 3).

The apparatus is sterilised in hospital by tapping any pipe-line in the sterilising room of the operating theatre and

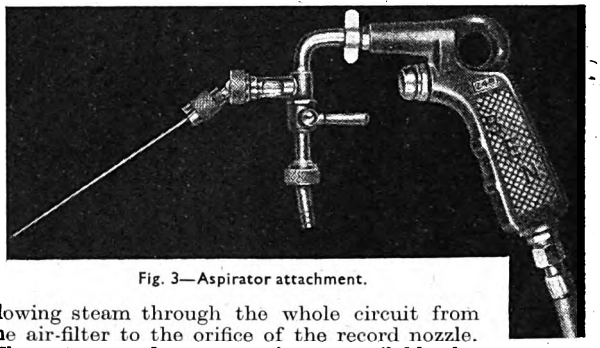

Fig. 3—Aspirator attachment.

blowing steam through the whole circuit from the air-filter to the orifice of the record nozzle. Where steam under pressure is not available the apparatus may be sterilised by steam obtained from a small welded stainless-steel pressure kettle which forms part of the equipment, and which can be boiled on a 'Primus' stove or on an ordinary fire.

Once sterilised the infiltrator may be charged with 6 litres of acidified saline solution and closed. In this condition it can be kept sterile for several days and when it is necessary to bring the apparatus into action the required amount of analgesic drug in the form of sterile powder and the necessary amount of adrenaline are added to the saline solution. A solution composed of 1–3000 amethocaine hydrochloride ('Anethaine') together with adrenaline will suffice as a long-acting analgesic solution for either nerve-block or infiltration technique. In this concentration large amounts, up to 1 litre, may be used on a single patient. The 6 l. of solution allows an ample reserve for a large number of cases. Spare insets, equipped with lids may be used to carry supplementary charges of ready-prepared sterile analgesic solution, but the adrenaline should not be added until the solution is required for use.

The apparatus has a hinged lifting-bar so that it can be carried by two people easily, or for short distances by one person. The usual technique, when using steam sterilisation is to keep only the record nozzle and needle sterile. The external surface of the pistol and rubber hose is of course non-sterile, and injections are made by the non-touch technique. If the surgeon wishes to use the apparatus during the operation, a second pistol and rubber hose, which have been sterilised are plugged into the infiltrator. If a number of patients are to be injected by members of the operating team—for example, when a large number of casualties have to be treated—then several pistols can be supplied through T-piece connexions, the infiltrator acting as a central reservoir.

Where plenty of compressed air is available the patient's skin may be rapidly sterilised by using an ordinary industrial type of paint-spray gun charged with tincture of iodine,

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flavine in spirit or any other suitable preparation. Only a small pressure (about 7 lb. per sq. in.) is needed to operate such a gun. The compressed air may also be used to operate a new type of injector which will produce negative pressure under absolute control for use in all known applications of suction to surgery.

Since the accompanying photographs were taken the infiltrator has been modified in several minor ways; it is now more compact, and a cover of metal sheeting has been provided which locks over it like a hood; several of the smaller parts have been improved.

Among the many individuals and firms that have helped me to evolve this apparatus, I wish particularly to thank BEN Patents, the Blaker Motor and Welding Co., Glaxo Laboratories and the Spirax Manufacturing Co. for their generous help. I also wish to thank Mr. H. A. Talley of Medical and Industrial Equipment for his advice and help, especially in the construction of the injector.

AGGLUTINATION TITRES OF NORMAL SERA

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DURING the past twenty years observations have been made in various parts of the world on the occurrence of agglutinins for the enteric group of bacteria in the sera of samples of the normal population. In the studies of Rosher and Fielden (1922) and Smith, MacVie and Newbold (1930) made in this country formolised suspensions were used, and their papers record the incidence of agglutinins to the flagellar antigens of *Bacterium typhosum, paratyphosum B, paratyphosum A* and certain other members of the salmonella group; the bacterial suspensions used by these authors were prepared in the laboratories where they worked.

Many laboratories in this country now use for routine agglutination tests the bacterial suspensions prepared by the Standards Laboratory in Oxford. As it seemed possible that there might be an increase in the incidence of enteric and dysenteric infections during the war the present observations were made to determine the level of agglutinins in the normal civilian population against certain salmonella and dysentery suspensions issued for routine work by the Standards Laboratory. Suspensions of *Brucella abortus, Vibrio choleræ* and of two strains of proteus were also included in the routine tests.

The general plan of the investigation was that the same sera were tested in two laboratories at Watford and Cambridge, using an agreed technique in setting up and reading the tests. This technique is subsequently referred to as "Standard." The bottles of suspension of each type of bacterium used in the two laboratories had been filled from the same bulk batch of suspension. The comparison of the results from the two laboratories served to indicate variations due to personal errors in making the tests. Other series of tests made in the two laboratories on other lots of sera with variations in technique, particularly in the method and time of reading the tests, have been compared with the combined results of the two laboratories on the sera tested by the standard technique.

Standard technique.—From sera diluted 1 in 10 with saline twofold dilution, were made in saline using graduated ten c.cm. pipettes. Starting with the highest dilution of serum and working back to the 1 in 10 dilution a unit volume of each dilution (0·25 c.cm. Watford and 0·3 c.cm. Cambridge) was delivered into Dreyer's agglutination tubes. An equal volume of bacterial suspension was then added. A fresh pipette was used for each serum and each suspension. The tubes were incubated at 55° C., care being taken that the water in the bath reached half-way up the column of liquid in the tubes so as to produce convection currents.

In the standard technique the end-point was agreed upon by the two laboratories as the highest dilution which showed agglutination visible at a glance to the naked eye, using artificial light and a dark background. Readings of results with H suspensions were made after 2 hours and 4 hours, and with O suspensions after 4 hours, at 55° C. Titres were recorded as reciprocals of the dilution of serum in which an end-point reaction occurred and are referred to in this way throughout the paper.

RESULTS

Tests on the same sera made in two laboratories using standard technique.—A hundred sera collected from prospective blood donors at Cambridge during July and August, 1941, were titrated at Cambridge and Watford by M. R. and H. S. respectively. The suspensions tested are shown in table I, which gives a summary of the results. The suspension of *Bact. typhi-murium* O had a reduction factor of 0·5 and the *Vibrio choleræ* suspension a reduction factor of 2. With all the other suspensions the reduction factor was unity (see Directions 1930). These factors have not been taken into account in presenting the figures in any of the tables; their use would not have raised the limit of normal agglutination.

The Cambridge readings were often higher than those made at Watford, but although a greater percentage of sera were recorded at Cambridge as agglutinating at 20 or over, the range of titres was not greatly increased. The greater number of sera recorded by M. R. as positive in dilutions of 1 : 20 to 1 : 160 was not, as far as could be judged, due to differences in the methods of setting up the tests. With one group of sera a single set of tests were set up and read independently by M. R. and H. S. In the majority of tests M. R. recorded the titre as twice that of H. S.—i.e., she recorded the end point as one tube higher. The difference between the Cambridge and Watford readings shown in table I was considered to be due mainly to the greater keenness of M. R.'s eyesight.

In assessing the upper limit of "normal" titres, when only one serum gave a higher reading than the other 99 it has been ignored. When, however, the highest titre recorded was attained by more than one serum—e.g., table I, *Bact. flexneri Y*—the normal range contains 100% of the observations. In most cases, although not in all, the Cambridge normal range was the greater. In fixing the upper limit for the "combined" normal range for the two sets of observations the higher value for the limiting titre, whether recorded at Cambridge or Watford, has

TABLE I—FREQUENCY DISTRIBUTION OF END TITRES OF 100 SERA

	WATFORD							CAMBRIDGE						
	< 20	20	40	80	160	320	Total % +	< 20	20	40	80	160	320	Total % +
Bact. typhosum O	98	2	..	..	..	..	2	91	7	2	..	..	..	9
Bact. typhi-murium H	89	6	3	2	..	..	11	82	13	3	1	1	..	18
Bact. typhi-murium O	93	5	2	..	..	..	7	78	14	7	1	..	..	22
Bact. enteritidis H	89	7	1	2	..	1	11	89	5	2	1	2	1	11
Group Salmonella H	84	4	7	1	4	..	16	78	7	9	4	2	..	22
Bact. newport H	99	..	1	..	..	..	1	94	3	3	..	..	..	6
Brucella abortus	98	..	1	1	..	..	2	98	..	2	..	..	..	2
Bact. sonnei ..	100	..	..	..	..	..	..	99	1	..	..	..	..	1
Bact. flexneri V ..	92	7	1	..	..	..	8	89	8	3	..	..	..	11
,, ,, W ..	94	5	..	1	..	..	6	88	8	3	1	..	..	12
,, ,, X ..	92	4	3	..	1	..	8	97	..	1	2	..	..	3
,, ,, Y ..	43	24	26	3	4	..	57	26	27	33	10	4	..	74
,, ,, Z ..	72	19	8	..	1	..	28	48	27	18	7	..	..	52
Bact. newcastle ..	87	7	5	1	..	..	13	93	4	3	..	..	..	7
Vibrio choleræ H ..	99	..	..	1	..	..	1	100	..	..	..	..	..	..
Proteus OX19 ..	86	11	2	1	..	..	14	71	18	10	1	..	..	29
Proteus OXK ..	9	24	64	3	..	..	91	0	7	93	..	..	..	100

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been selected. The upper limits of normal titres assessed in this way are recorded in table II, series N, columns 1 and 2.

TABLE II—LIMITS OF "NORMAL" AGGLUTININS FOR DIFFERENT SERIES OF TESTS

Series	N		A		B	C
No. of sera tested	100		80		200	200
Column	1	2	3	4	5	6
Time of reading tests—						
hr. at 55° C.	2	4	4	4	4	24
hr. at room temp.	..	..	..	20	20	..
Method of reading	Naked Eye		Lens		Lens	Lens
Bact. typhosum O	..	40	40	80	80	nt
Bact. typhi-murium H	80	80	80	80	40	160
Bact. typhi-murium O	..	40	80	80	40	160
Bact. enteritidis H	40	160	40	40	40	320
Group Salmonella H	80	160	80	80	160	160
Bact. newport H	20	40	20	20	80	160
Brucella abortus	..	40	80	80	80	40
Bact. sonnei	..	< 20	< 20	< 20	80	160
Bact. flexneri V	..	40	80	80	160	160
" " W	..	40	80	80	160	80
" " X	..	80	80	160	160	640
" " Y	..	160	160	160	320	160
" " Z	..	80	80	80	160	160
Bact. newcastle	..	40	160	160	80	160
Vibrio cholerae H	< 20	< 20	< 20	20	20	160
Proteus OX19	..	40	80	160	nt	nt
Proteus OXK	..	80	80	80	nt	nt

.. = no reading made. nt = not tested.
The figures for Series N and A represent the combined results of two laboratories.
The figures for Series B and C represent the results of individual laboratories.

Variations in range of titres according to time at which tests were read and method of reading.—Table II shows the upper limits of normal titres calculated on the 99% basis for various sets of sera tested. As indicated in the table, the various lots of sera were read at different times, and some were read with the aid of a hand lens. The figures for series N and A show the combined normals of M. R. and H. S. on two batches of sera from prospective blood donors. Series A was examined by H. S. and M. R. independently before the method of reading was standardised as for series N. Series B was 200 routine Wassermann sera examined in Watford by H. S. in the summer of 1940 and series C 200 sera from prospective donors examined by H. L. C. at Cambridge during the same period, the results in the latter case being read only after 24 hours at 55° C.

The figures for H suspensions in columns 1 and 2 show, as might be expected, a slight increase in titre in the four-hour as compared with the two-hour reading. The readings in columns 3 and 4 (series A) do not show an increase in the range of titres as a result of an extra 20 hours at room temperature after 4 hours at 55° C. The extra period at room temperature did, however, increase the percentage of sera showing agglutination within the normal range as determined by the readings after 4 hours at 55° C. The results shown in table III, giving details of the findings with the *Bact. flexneri Y* suspension in series A table II, illustrate this point.

TABLE III—EFFECT OF 20 HOURS AT ROOM TEMPERATURE AFTER 4 HOURS AT 55° C. ON TITRES OF NORMAL AGGLUTININS FOR *Bact. flexner Y* SUSPENSION

Readings made after—	Percentage of sera showing end-point in dilution of 1 in.—				Total % + 1 in 20 or over
	20	40	80	160	
4 hr. at 55° C.	34	6	2	..	42
4 hr. at 55° C. and 20 hr. at room temperature	38	34	6	2	80

The results of the tests with series B (table II, column 5) are not greatly different from those readings made after a similar interval in series A (table II, column 4). The normal range shown by series C (table II, column 6) is considerably higher than the others, owing presumably to the unduly long time of holding the tests at 55° C. The results of the various series of tests shown in table II cannot all be used for an accurate evaluation of the effect of the time of incubation on the results, as different batches of sera were used and the readings were made by different observers. Table IV shows the range of titres obtained on 160 sera, tested by the same observer (M. R.) and read after three different periods. Of these 160 sera the results on 80 are included in table II, columns 3 and 4.

The normal range of the sera for the four salmonella H suspensions recorded after 2 hours was not greatly different from that after 4 hours, and nothing would appear to be gained by departing from the common practice of reading the results with H suspensions after 2 hours. Agglutination of O suspensions was not usually visible after 2 hours. As in series A (table II, columns 3 and 4), there was little difference in the normal range of titres after 4 hours and after the tests were kept a further 20 hours at room temperature. There is no advantage in leaving the tests at room temperature overnight before reading the results. As mentioned below, the end-point may be more difficult to determine at this time.

Allowing for the technical variations in setting up and reading the tests on the different batches of sera there was no great divergence in the results obtained. The readings made on the 560 sera recorded in table II, columns 3 to 6, and table IV add a certain weight to the normal values for the 100 sera examined by the standard technique (table I and table II, columns 1 and 2).

The end-point.—We do not advocate the estimation of the end-point by interpolation involving the use of factors as described by Dreyer and Inman (1917), since

TABLE IV—LIMITS OF "NORMAL" TITRES ON THE SAME 160 SERA READ AT DIFFERENT TIMES

—	2 hr. 55° C.	4 hr. 55° C.	4 hr. 55° C. and 20 hr. room temp.
Bact. typhosum O	< 20	80	160
Bact. typhi-murium H	< 40	80	80
Bact. typhi-murium O	< 20	80	80
Bact. enteritidis H	160	160	160
Group Salmonella H	80	160	160
Bact. newport H	< 20	20	40
Brucella abortus	20	80	80
Bact. sonnei	< 20	< 20	< 20
Bact. flexneri V	< 20	80	80
" " W	< 20	80	80
" " X	< 20	80	80
" " Y	< 20	160	320
" " Z	< 20	80	80
Bact. newcastle	< 20	80	160
Vibrio cholerae H	< 20	40	40
Proteus OX19	< 20	80	80
Proteus OXK	< 20	80	80

the interpretation of different degrees of agglutination is difficult unless large numbers of tests are constantly made by a given observer. There is, moreover, no uniformity among the different suspensions in the way the degree of agglutination falls off with increasing twofold dilution, so that interpolation factors must be calculated for each suspension of bacteria tested. For these reasons we advocate an end-point depending simply on a single degree of agglutination equivalent to Dreyer and Inman's "Standard"; and we have chosen a relatively high degree to avoid the difficulties of the persistence of traces of agglutination in increasing dilutions of sera (tailing off). For the same reason the four-hour reading is preferable to 24 hours; tailing off is more marked after 24 hours and deposits are common in the control suspensions, particularly with the dysentery bacteria. The significance of the tailing off of positive tubes as an indication of antibody level in a serum is not clear.

The four-hour naked-eye reading is easy and convenient, and the adoption of normal ranges based on the examination of a large number of "normal" sera in this way would automatically exclude the "tailing off" titres from consideration. While we agree with Felix and Gardner (1937) that agglutination of H suspensions should be recorded after 2 hours, we suggest that the reading for O type of agglutination should be made after 4 hours' incubation at 55° C. in place of their recommended 20–24 hours.

COMMENT

The normal agglutinins for the salmonella suspensions as indicated in tables I and II are not greatly different from those previously recorded in this country (see Topley and Wilson 1936). It will be seen that H suspensions

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of those salmonella organisms usually responsible for food poisoning of the infection type (*Bact. typhi-murium, Bact. enteritidis, Bact. newport*) may be agglutinated by a small proportion of "normal" sera up to a titre of 1/80 or 1/160.

The absence of normal agglutinins for smooth suspensions of *Bact. sonnei* (when tests are read after 4 hours at 55° C.) appears to give added significance to the finding of agglutinins for this organism in the sera

TABLE V—DISTRIBUTION OF FOUR-HOUR END TITRE FOR PROTEUS SUSPENSIONS IN 74 WIDAL SERA

Proteus	Titres				Total % positive	Normal Limit
	< 20	20	40	80		
OX19 ..	86	7	7	0	14	40
OXK ..	23	31	45	1	77	40
OX2 ..	88	7	5	0	12	40

of dysentery convalescents when the infecting organism has not been isolated from the stools. Although agglutinins fail to appear in the sera of a certain number of Sonne dysentery patients the examination of convalescent sera may give useful results (see Hobbs and Allison 1942). From the results obtained with the other dysentery suspensions it is obvious that the presence of agglutinins for these organisms in low titre (up to 1/80) at a single examination can be of little diagnostic significance. The suspensions of *Bact. flexneri. Y* seem particularly liable to agglutination with normal sera. Nevertheless agglutinins to a significantly high titre may appear in the sera of a fair proportion of patients (Scott 1940, personal communication).

The figures for *proteus* suspensions are of interest in view of the present European prevalence of typhus fever. Agglutination tests gave clear-cut end-points when read after 4 hours' incubation at 55° C., and the results for 100 normal sera examined at both laboratories are set out in table I and table II, column 2.

In an additional series of tests on 74 Widal sera examined at Watford during November, 1941, and September, 1942, *Proteus OX19, OX2* and *OXK*, were included among the test suspensions. Table V demonstrates that the results with OX2 and OX19 are almost identical, the normal limit for both being 40. There is a greater proportion of positives with OXK, but the normal limit in each is 40. This figure lies within the combined normal limit for OX19 and OXK determined in series N (table II, column 2).

These figures are within the normal limits defined by Felix (1930 and 1933). He showed (1933) that OXK suspensions are more susceptible to non-specific normal agglutinins than are suspensions of OX19 and OX2, and suggested that the minimum titre of significant OXK reactions should be double the titre required in OX19 and OX2 agglutination—i.e., significant diagnostic titres for OX19 and OX2 would be 1 : 80 or 1 : 100, and for OXK 1 : 160 or 1 : 200. The examination of 100 normal sera for proteus agglutinins recently reported from Cardiff gave results almost identical to those recorded in this paper (Monthly Bulletin 1942).

Dr. Felix (personal communication) points out that the relatively low figures for O suspensions in table I, compared with those obtained by other workers, may have been due in the first place to the incubation of the serum-suspension mixtures at 55° C. Felix and Gardner (1937) recommended 50–52° C., in view of Felix and Olitski's (1929) demonstration of the heat lability of O antibodies. He also suggests that the use of Dreyer's tubes with pointed ends may have obscured positive agglutinations, and recommends round-bottomed tubes.

SUMMARY AND CONCLUSIONS

Duplicate tests were made in two laboratories to determine the agglutination titres in the sera of healthy adults against some of the commoner intestinal pathogens and *Proteus* O suspensions.

The end-point finally chosen in reading the results was the highest serum dilution showing any degree of agglutination visible at a glance to the naked eye, after incubation in the water-bath for 2 hours in the case of H suspensions and 4 hours for O suspensions.

When an agreed standard technique was used differences between the readings recorded after 4 hours at 55° C. in the two laboratories were apparently largely due to a difference in the acuity of vision of the observers.

Tests made on 560 normal sera showed that the difficulty of obtaining comparable readings was increased by longer exposure at 55° C. in the water bath, by allowing the tubes to stand overnight at room temperature or by using a hand lens in reading the results.

The technique adopted—incubation at 55° C.—may have been responsible for the comparatively low level of normal O agglutinins recorded; incubation at 50–52° C. might have yielded slightly greater titres.

We wish to thank Lieut.-Colonel R. F. Bridges of the Standards Laboratory, Oxford, for supplying the suspensions, and Prof. H. R. Dean and Mr. H. P. Hudson of the Pathology Department, Cambridge, for many of the sera.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

AT a meeting of the section of epidemiology and state medicine on May 25, with Dr. E. H. R. HARRIES, the president, in the chair, a paper on

Diphtheria in Scotland

was read by Sir ALEXANDER RUSSELL, of the Department of Health for Scotland. The Scottish death-rate from diphtheria, he said, showed a steady fall from about 1863 till about 1922, after which it remained fairly constant until the epidemic of 1940–41. Mass immunisation began in mid-December, 1940, only some 122,000 children having been immunised before that date. About 800,000 had now been protected. By the end of 1941 about 71% of the school-children and 56% of the pre-school children had been immunised, but since then the proportion had declined slightly and at present it might be said that about 60% of the child population aged 1–15 were protected. Allowing for the fact that immunisation had been started at the peak of the epidemic, the results justified restrained optimism. Incidence had decreased and mortality in the past twelve months was much lower than any previous record in Scotland. Comparing immunised and non-immunised in 1941–42, the immunised child was eight times less liable to attack, and in the pre-school group twenty times less liable. More striking was the fact that the immunised child was more than a hundred times less liable to die of the disease if he contracted it.

Reactions had been few, and the need to use TAF for older age-groups had not been borne out in practice. Eight children in three different areas had developed varying degrees of paralysis of the 5th and 6th cervical nerves on the injected side 14–25 days after the second injection. They had all been inoculated (together with 4000 others) with the same batch of toxoid. Six cases had made a complete recovery and one of the two others had been definitely diagnosed as anterior poliomyelitis. The particular toxoid gave negative tests for infection and toxicity and no evidence of a neurotropic virus was obtained. Prof. W. J. Tulloch had not found an abnormal carrier-rate in the immunised, 7 out of 369 immunised being positive and 9 out of 426 not immunised. There had been a very great increase in the proportion of gravis infections; for example, in the Dundee area in 1933–34,

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6% were gravis, but in 1941–42 the figure had risen to 85%. Should not toxoid, therefore, contain anti-gravis elements which were not included at present? Equally striking was the shift of incidence to the older age-groups. In 1940, 23% of infections were at the age of 15 or over; in 1942, these ages formed 34% of the total. This shift could not necessarily be attributed to immunisation, since it had been noted in Glasgow between 1906 and 1913 and was then presumed to be the result of epidemic conditions.

Dr. J. A. H. BRINCKER (Ministry of Health) said that unfortunately in England and Wales no returns were available for a strict comparison with Sir Alexander Russell's figures. The position was not so good as in Scotland, though it was probable that more than half of those aged 1–15 were immunised. In 1941 there were 5·6 cases in non-immunised children for every 1 in an immunised child, and in 1942 the ratio was 5 to 1. Again, in 1941, 29 non-immunised children died for 1 immunised child, and in 1942 the ratio was 27 to 1. There was substantially no opposition from parents in principle: the proportion immunised depended chiefly on the facilities available. The gravis type had, of course, increased before mass immunisation began.

Dr. J. L. BURN (Salford) said that immunisation was a condition of entry to war nurseries in his area. Birthday cards had proved most successful. Selected nurses had been found in practice quite capable of carrying out the immunisation.

Dr. PERCIVAL HARTLEY, FRS (director of biological standards, Medical Research Council), pleaded for better records by doctors: it was often impossible to trace the batch of toxoid used. He thought that the question of including antigens of the gravis strain was important.—Dr. STANLEY BANKS (LCC) said that the clinical picture entirely supported the epidemiological figures. Patients showed a struggle between the protection conferred by immunisation and the gravis infections.—Capt. J. E. WILLIAMS (Canadian Army) drew attention to the danger of the loss of immunity some eight years after leaving school. Of a batch of recruits 27% had lost immunity, as judged by the Schick test, but all except one regained it with a single boosting dose.

The PRESIDENT thought that the striking fall in mortality in Scotland, as in England, between 1896 and 1900, was due to the introduction of serum therapy. He had been interested in diphtheria immunisation on a retail scale for many years and was glad to find that it had now become a wholesale business.

Reviews of Books

British Medicine and the Vienna School

MAX NEUBURGER, MD, Ph D, Wellcome Historical Medical Museum, London: formerly professor of the history of medicine, University of Vienna. (Heinemann. Pp. 134. 10*s.* 6*d.*)

IN the middle of the eighteenth century the school of medicine in Vienna rose into prominence under the leadership of Van Swieten and De Haen, disciples of the celebrated Dutch physician Boerhaave. Boerhaave brought medicine from its reliance on theory back to the bedside, laying stress on the value of accurate clinical observation, and he regarded Sydenham as the originator of a new and fruitful system of medical teaching. Sydenham's observations and teaching formed the ideal of clinical practice for Boerhaave's disciples and they continually quoted him and the school of British physicians who followed. Thus Vienna and Great Britain at this time were almost identical in views and practice, and in both schools the writings of prominent teachers were promptly translated and became common property. The tradition thus established remained unimpaired for many years, Vienna becoming the Mecca of the British medical traveller, London and Edinburgh (and to a smaller extent Dublin) those of the Viennese. For more than half a century leadership in medicine on the Continent remained with the succession of distinguished physicians who followed Van Swieten; then it passed to Paris until the middle of the nineteenth century, when a new school arose in Vienna associated with the names of Rokitansky and Skoda. Vienna again began to lead the world in medicine and almost up to our own time remained the favoured resort of the foreigner who wished to learn at first hand.

The story of the intimacy between Vienna and Great Britain is here set forth briefly by Professor Neuburger, but the book has been planned on too small a scale to do justice to his extensive knowledge; in happier days he might have expanded it to a volume treble its present size, and still have escaped the charge of prolixity. Even in its present compact form, however, it is a record of international coöperation in the best traditions of medicine. He writes of the wisdom, benevolence and humanitarianism of the Emperor Josef II who not only founded and endowed the great Allgemeines Krankenhaus but provided scholarships enabling promising young men to travel to England and Paris; thus he ensured width of culture and experience in the future teachers of the school. One can hardly recall similar provisions in any country until the foundation of the Rockefeller fellowships.

Textbook of Surgical Treatment

Including Operative Surgery. Editor: C. F. W. ILLINGWORTH, MD Edin., FRCSE, regius professor of surgery, University of Glasgow. (Livingstone. Pp. 528. 28*s.*)

WITH the help of 18 able contributors Professor Illingworth has aimed at giving senior students and those undergoing training in surgery an "understanding of surgical treatment in the wider sense." He has a high endeavour and the material is there; but as an exponent of surgical opinion the editor (who admits to having modified the individual contributions) is not always a reliable guide, nor does he always give the young surgeon enough detail to help him over difficult ground. With a little closer collaboration of the team the inequalities in presentation could easily be remedied and a fine textbook evolved. It is no mean achievement to have brought out in war-time a book of this kind, and the printing and make-up are amazingly good.

Physical Chemistry

For Students of Biochemistry and Medicine. EDWARD STAUNTON WEST, PhD, professor of biochemistry in the University of Oregon. (Macmillan. Pp. 368. 28*s.*)

SOME ten or twelve years ago professors of chemistry and allied subjects showed a grim determination to provide detailed textbooks of physical chemistry for students of biology and medicine; six stout volumes then appeared at an alarming rate—but like much heavy ammunition, it left the intended victims almost untouched. Attempts to turn the medical student into a competent physical chemist are futile. In the first place he usually knows only the most elementary mathematics and has a strong aversion even to that innocent mathematical conception, a logarithm. Apart from this almost inherent resistance, his time has become more and more limited as more and more subjects have been crowded into his curriculum. After that first burst of textbooks on physical chemistry there seems to have been a lull in the attack; the present volume may perhaps be the forerunner of another bombardment. It is a very good book embracing the whole subject; and that it is clearly written, excellently documented and indexed goes without saying; but whether British medical students will have any time to read it is another matter. To mention only one or two sections, the introduction and the second chapter dealing with the structure of matter will repay study by any medical student or, for that matter, by his teachers.

Synopsis of Traumatic Injuries of the Face and Jaws

DOUGLAS B. PARKER, MD, DDS, associate professor of oral surgery, Columbia University, New York. (Kimpton. Pp. 334. 22*s.* 6*d.*)

THE book is designed to cover the first-aid treatment of injuries of the face and jaws at the time of injury and is addressed to both surgeons and dentists. It is apparently based on experiences in the last war and on civilian injuries since then, but it is an inadequate presentation of the subject and is scarcely suitable as a vade-mecum for surgeons treating these injuries at the present time. The author will probably wish to rewrite it in the light of further experience of this war.

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THE LANCET

LONDON: SATURDAY, JUNE 12, 1943

FEEDING WITH AMINO-ACIDS

WHEN the amino-acids were proved to be the *Bausteine* of the protein molecule, and it was realised that extensive hydrolysis was an essential part of the digestive processes, it was a logical step to see if hydrolysed proteins supported life and growth. It was quickly found that they did. Animals were maintained in nitrogen equilibrium by these hydrolysates, even when they were given intravenously,[1] and these discoveries were among the triumphs of the early part of the century. Working mainly on the rat, ROSE and others[2] next set out to find which of the large number of amino-acids were essential for complete nitrogenous nutrition, and in the process they discovered that one of the indispensables was a compound hitherto unknown. Within recent years solutions of amino-acids have begun to be administered to man. Mixtures of the acids have been made in at least three different ways. Acid hydrolysis,[3] the most popular method, presents no great technical difficulties, but at least one essential amino-acid (tryptophane) is destroyed by the hot acid, so it must be separately prepared and added to the hydrolysed mixture, which is expensive. Enzymic hydrolysis has also been used.[4] This gives a solution of amino-acids and simple peptides which might be expected to provoke anaphylactic reactions, but apparently this is not the case, and the incompleteness of the hydrolysis is of no biological significance. MADDEN and others[5] have also employed a mixture of the ten purified amino-acids which are known to be essential for the rat. These experiments have so far been limited to dogs, and this third method is obviously far too expensive at present for use in human therapy; nor does it seem necessary.

Solutions of mixed amino-acids prepared by acid or enzymic hydrolysis are now being recommended as therapeutic agents. They have been given by mouth,[6] but more usually by vein, and it is said that they will keep patients who cannot take food by mouth in nitrogen equilibrium. No new principles are involved. The possibilities of amino-acid medication have been known since 1913, and glucose has been administered intravenously for years as a means of supplying predigested carbohydrate to patients who may be unable to swallow or assimilate the natural forms. The amino-acid solutions have been given by ELMAN[4,7] and others[6,8] to patients suffering from carcinoma and ulceration of the intestinal tract, pneumonia, burns and shock, and to infants with acute gastro-intestinal disturbances[9]; they have also been used before and after major operations, and to stimulate the formation of new plasma proteins. The published reports are enthusiastic—the patients are reported to be benefited in a number of ways—but few of the observers have carried out any controls, and it is evident that some of the work has been financed by companies likely to benefit from the manufacture and sale of the amino-acid hydrolysates.

It is hard to see why a solution of mixed amino-acids prepared from casein should be any better for a man than a good glass of milk. It is hard to see, therefore, why they should ever be given by mouth, and their use in this way is not likely to continue unless it is stimulated by skilful advertising, as was the use of glucose before the war. By vein they have an obvious value, although their administration is not yet through its teething troubles. This form of therapy has probably come to stay—in fact it is likely to become fashionable because it will be easy to speak impressively about it, and it will appeal to the public imagination. Moreover, in few cases will it be possible to come to any real conclusion as to its value. For the present it should be used critically. It is one thing to administer a solution of glucose to a man with an inoperable new growth, if by so doing one can relieve his dehydration and make his last hours more comfortable. It is another to prolong his life for weeks by supplying him with all his nutritional requirements intravenously. Again, amino-acid solutions have been recommended for people suffering from hypoproteinæmia. Apart from the fact that many of these patients can take ample protein by mouth, the obvious therapy for them would be infusions of ready-made plasma proteins,[10] especially if as WHIPPLE[11] believes these plasma proteins "take an active part in the internal protein metabolism of the body and supply practically all the protein requirements of the cells." In short, we should concentrate on the use rather than the abuse of this new form of therapy with which biochemistry has entrusted medicine.

EXTERNAL-INTERNAL FIXATION

ONE of the potted abstracts that are a sign of the times lately reported from America a "new method" of hastening the healing of fractures. A veterinary surgeon had invented a form of external metal scaffolding for fractured bones in animals which was claimed to ensure absolute immobilisation of the fracture without open operation or splints, and immediately to restore almost normal function in the damaged limb. Great ingenuity has been exercised by many surgeons for the same object. All these measures have involved some external scaffold, of plaster or metal rods, carrying pins which pass through the skin into the bone above and below the fracture. Mechanically the principle is similar to a Lane's plate which is screwed direct to the bone; surgically it differs in avoiding open exposure of the fracture by having the plate outside the limb. The principle is by no means new. LAMBRET[12] in 1911 inserted two single Steinmann pins, one above and one below the fracture in a tibia, and joined them by two external metal rods. With single pins immobilisation cannot have been perfect and there is

1. Henriques, V. and Andersen, A. C. *Z. physiol. Chem.* 1913, **88**, 357.
2. Rose, W. C. *Physiol. Rev.* 1938, **18**, 109.
3. Martin, G. J. and Thompson, M. R. *Medicine*, 1943, **22**, 73.
4. Elman, R. *Trans. Amer. surg. Ass.* 1940, **58**, 112.
5. Madden, S. C., Carter, J. R., Kattus, A. A., Miller, L. L. and Whipple, G. H. *J. exp. Med.* 1943, **77**, 277; Robschelt Robins, F. S., Miller, L. L. and Whipple, G. H. *Ibid*, p. 375.
6. Altshuler, S. S., Sahyun, M., Schneider, H. and Satriano, D. *J. Amer. med. Ass.* 1943, **121**, 163.
7. Elman, R. *Ibid*, 1942, **120**, 1176.
8. Brunschwig, A., Clark, D. E. and Corbin, N. *Ann. Surg.* 1942, **115**, 1091.
9. Shohl, A. T. *J. clin. Invest.* 1943, **22**, 257.
10. Casten, D., Bodenheimer, M. and Barcham, I. *Ann. Surg.* 1943, **117**, 52.
11. Whipple, G. H. Editorial *Surg. Gynec. Obstet.* 1941, **73**, 886; *Lancet*, 1942, **ii**, 491.
12. *Pr. méd.* 1911, p. 545.

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no record that his patients were allowed to walk about. In view of modern developments the work of LAMBOTTE [13] is even more remarkable. In an appendix to the report of a BMA fracture committee in 1912 this pioneer of internal fixation illustrated an apparatus for treating a fractured radius in which two parallel pins were inserted above and two below the fracture, all the pins being held together by an external metal plate. HEY GROVES [14] independently invented a similar apparatus for fractured femur which he described in 1916.

Whoever was the first in this development, for some years ROGER ANDERSON [15] and HAINES have been using it successfully in America, and their methods were introduced by PHILIP WILSON and his colleagues at the American Hospital in Britain in 1940. Two or more long screws, Kirschner wires or gimlet-pointed nails are inserted, above and below the fracture; they can be parallel but more usually converge within the bone. Each group of nails, wires or screws is attached to an external plate, and the plates on each side of the fracture are joined by an adjustable rod, a series of rods, a plaster sleeve or a plaster bar. The pins are bound to lie very close to the joints above and below the fracture and in most cases will transfix muscles, so that there must be some limitation of movement in these joints while the appliance is in place and for some time afterwards. There are obvious risks of infection along the pin tracks, which if it occurred would also gravely interfere with the restoration of movement. By applying distracting apparatus to the pins in the initial stages perfect reduction of the fracture can be achieved, but if not done correctly such distraction may delay union, as WATSON-JONES and COLTART [16] lately pointed out. Experience in several EMS hospitals where apparatus of the kind has been used has shown that precise attention to detail is required. Nevertheless, well applied it does allow the patient to move about to an amazing extent throughout treatment.

The indications for the use of splints of the Roger Anderson type have yet to be worked out in this country. ANDERSON [17] himself would apply them to any fracture of a long bone, whether transverse, comminuted or compound, even when it extends into a joint, and calls this method an ideal supplement to many orthopædic procedures, such as arthrodesis of the knee, and operations for non-union, malunion, length equalisation and reconstruction. His transfixion units and fixation rods, made of a rustless alloy, are standardised in three sizes, so as to be applicable to anything from a femur to a metacarpal. His whole apparatus for immobilising a fractured femoral shaft weighs only 12 oz., and he illustrates a sterilisable metal case weighing less than 20 lb. which holds enough material to reduce and immobilise 25 long-bone fractures. At Hill End Maxillo-facial Unit the technique has been adapted to fractured mandible,[18] and has proved particularly useful in the edentulous jaw. CAPENER [19] has used such a splint for an air-raid fracture of the femur in a pregnant woman where the fracture had recurred after bone-grafting, and a breech was delivered normally a month later. Whether the "castless ambulatory method," as ANDERSON calls it, will be adopted as universally as he thinks remains to be seen. As ROBERT JONES has said, "Before we reach to new things we must ask ourselves if we have done the best by the old; and it is only by being critics of our own work that we can discover, each for himself, which procedure will, in his own hands, give the best result."

13. Lambotte, A. *Brit. med. J.* 1912, ii, 1530.
14. Hey Groves, E. W. Modern Methods of Treating Fractures, Bristol, 1916.
15. *Northw. Med., Seattle*, 1931, **30**, 444.
16. Watson-Jones, R. and Coltart, W. D. *Brit. J. Surg.* 1943, **30**, 260.
17. *J. int. Coll. Surg.* 1942, **5**, 458.
18. Mowlem, R., MacGregor, A. B., Buxton, J. L. D. and Barron, J. N. *Lancet*, 1941, ii, 391. Cf. Converse, J. M. and Waknitz, F. W. *J. Bone Jt Surg.* 1942, **24**, 154.
19. Cited by Blundell Jones, G. *Brit. med. J.* 1942, ii, 158.

KIDNEY EXTRACTS AND HYPERTENSION

IN 1940 and 1941 reports came from the United States on the lowering of blood-pressure by injection of kidney extracts into animals and into human beings with hypertension.[1-3] This treatment arose from work in the laboratories of HOUSSAY in Argentina and PAGE in Indianapolis. These investigators showed that renal ischæmia leads to increased production of renin which, by its proteolytic action on a globulin in the blood, gives rise to a pressor substance called hypertensin or angiotonin.[4] They also proved that the kidneys can produce a substance capable of inhibiting the action of hypertensin. This substance, called by the Argentine workers hypertensinase, was regarded as the active principle in the kidney extracts capable of lowering the raised blood-pressure. Using amounts equivalent to 1000 g. of fresh kidney substance per day, PAGE and his colleagues [2] found that it lowered the blood-pressure and relieved symptoms in hypertension, though severe reactions were not unusual.

SCHALES, STEAD and WARREN [5] throw doubt on the hypotensive action of hypertensinase. They prepared a kidney extract which was biologically demonstrated to contain hypertensinase as well as renin and gave it in doses equivalent to 1000 g. fresh kidney daily to 7 patients with benign or malignant hypertension. In 2 of the patients there was no lowering of the blood-pressure and no untoward symptoms; in the other 5 the pressure fell significantly, but they showed severe reactions after 2–10 injections. Symptoms included fever, chills, sweats, anorexia and lethargy, severe induration at the injection site spreading over the sacral and lumbar areas from the buttock, and sometimes erythematous confluent macular eruptions. These reactions grew worse as treatment continued, and shock-like conditions supervened during the fourth week. When the injections ceased the blood-pressure rose to its former level within a fortnight. SCHALES and his colleagues then proceeded to inject 3 of these long-suffering patients with a similar extract in which 90% of the hypertensinase had been destroyed, and they observed exactly similar local reactions, constitutional symptoms and anorexia—and also significant falls in blood-pressure. This fact, together with the absence of hypotensive action in the 2 patients who did not exhibit

1. Grollman, A., Williams, J. R. and Harrison, T. R. *J. biol. Chem.* 1940, **134**, 115.
2. Page, I. H. and Helmer, O. M. *J. exp. Med.* 1940, **71**, 495; Page, I. H., Helmer, O. M., Kohlstaedt, K. G., Kempf, G. F., Gambill, W. D. and Taylor, R. D. *Ann. intern. Med.* 1941, **15**, 347.
3. Jensen, H., Corwin, W. C., Tolksdorf, S., Casey, J. J. and Bamman, F. *J. Pharmacol.* 1941, **73**, 38.
4. See *Lancet*, 1941, ii, 575.
5. Schales, O., Stead, E. A. and Warren, J. V. *Amer. J. med. Sci.* 1942, **204**, 797.

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toxic reactions, suggests that the beneficial effects on the blood-pressure were related to the febrile conditions rather than the hypertensinase in the extract. Indeed, STEAD and KUNKEL[6] had previously reported a lowering of blood-pressure in 2 cases of hypertension treated with malaria. But probably the rise in temperature is not itself responsible, for CHASIS, GOLDRING and SMITH[7] have reported a reduction in blood-pressure in 11 hypertensive subjects injected intravenously with pyrogenic material (pyrogenic inulin, triple typhoid vaccine or tyrosinase) when a rise of temperature was prevented by the injection of amidopyrine. This drug does not prevent the rise in renal blood-flow produced by pyrogenic treatment.

Clinical application of the experimental findings in hypertension is evidently premature. But the physiological rôle of the renin-hypertensin system is nevertheless becoming firmly established, and HAMILTON and COLLINS[8] have lately been able to show that this renal humoral mechanism is active in hæmorrhage and shock. They found that when dogs were bled of 20–45 ml. of blood per kg. of body-weight their blood acquired a pressor activity which it did not previously possess. This activity still developed when the kidneys were denervated, or the adrenals were removed, before the hæmorrhage, but not when the kidneys were removed; and this fact, with the observation that the pressor activity of renal-vein blood was higher than that of femoral-artery blood, and the general character of the pressor response, indicates that falls in blood-pressure cause liberation of renin. It was also noted that less hæmorrhage was required to lower the blood-pressure in nephrectomised dogs than in normal dogs. The injection of histamine induced pressor activity, just as hæmorrhage did, but this again did not happen in the absence of kidneys. Supporting the view that the pressor activity is due to renin is the observation that when renin was injected into nephrectomised dogs after a hæmorrhage, the pressor response was, if anything, slightly higher than that produced by a similar injection before the hæmorrhage, whereas in dogs with intact kidneys hæmorrhage almost abolished the pressor response to renin. This suggests that the secretion of renin during the hæmorrhage had been so great that tolerance to renin injections (tachyphylaxis) had developed.

6. Stead, E. A. and Kunkel, P. *J. clin. Invest.* 1940, **19**, 25.
7. Chasis, H. Goldring, W. and Smith, H. W. *Ibid*, 1942, **21**, 369.
8. Hamilton, A. S. and Collins, D. A. *Amer. J. Physiol.* 1942, **136**, 275.

Annotations

NEW ADVICE ON GAS GANGRENE

IT is remarkable that in this fourth year of the war very few of our medical men in uniform have any first-hand knowledge of gas gangrene, which at material times in the 1914–18 war affected 1–10% of the wounded, and which still has a fatality-rate of 40–50%. To improve our defective knowledge about this serious infection, the war wounds committee of the Medical Research Council produced in 1940 a useful memorandum on the subject, and a revised edition,[1] enlarged to twice the length of the original, is now appositely issued. It deserves careful study by regimental medical officers, surgeons and pathologists. Gas gangrene is an infection of tissues, usually muscle, by anaerobic toxigenic bacteria (*Clostridium welchii, Cl. septicum, Cl. œdematiens*) which with the exception of *œdematiens* invade the tissues already destroyed by their toxins. A knowledge of the conditions predisposing to gas gangrene will enable the medical officer to take early preventive action, and in the new edition these conditions are enumerated as extensive laceration of muscle as in compound fracture, obvious contamination of the wound with soil, clothing or other foreign body, interference with blood-supply as by a tourniquet or a tightly packed dressing, severe shock and (perhaps most important of all) delayed surgical treatment. Infection is most likely in wounds of the buttocks and legs, and it is well to remember that insignificant entry wounds may be associated with much muscle necrosis. The regimental medical officer must also be familiar with the symptoms and signs of commencing gas gangrene—the local pain and swelling, the quickening pulse, the altered mental attitude—which indicate an urgent need for medical treatment.

Gas gangrene is a combination of toxæmia and local bacterial invasion; so both prophylaxis and treatment have the dual purpose of preventing bacterial proliferation and counteracting toxin-production. Surgical excision of dead and dying tissue, about which the memorandum gives useful advice, is the most important single prophylactic; and it must never be unnecessarily delayed, for the incidence of gas gangrene rises steeply among wounds unattended for more than 24 hours. The surgical toilet should be supplemented by bacteriostatic drugs, both locally and systemically. For local use sulphanilamide alone or in combination with sulphathiazole is still the sulphonamide of choice, but local application will be relatively ineffective in unexcised and deep penetrating wounds. A trial might be given to the amino-acridines, such as proflavine, which experimentally are efficient in gas-gangrene infections. To counteract the bacterial toxæmia, polyvalent antitoxin is recommended, as soon as possible after wounding, for all casualties of the types likely to develop gas gangrene. Doses, for both prophylaxis and treatment, are three times the original dosage, and are now more in line with that suggested in THE LANCET primer on *Wound Infection*.[2] The new insistence on the prophylactic use of antitoxin is welcome, for in many quarters it was being condemned without fair trial. In this the committee may have been influenced by recent experience in the Middle East where *œdematiens* gas gangrene, which like tetanus is principally a toxæmia and unaffected by sulphonamide therapy, was the most common type of infection. Intravenous injection is recommended, which, if not so necessary for prophylaxis, is essential for the effective treatment of the incipient case. The clinical section ends with a number of questions that can be answered only by coördinated clinical and laboratory research, of which not the least important part is the careful recording of findings and treatment in every case of gas gangrene.

Compared with the original memorandum, this edition offers a much more detailed scheme for the isolation and identification of the gas-gangrene group of organisms and other wound pathogens. Laboratory workers will find the notes up to date and very useful; they have been prepared by the Committee of the London Sector Pathologists, and are largely the fruit of personal experiences. They would be even more valuable if short practical courses on the anaerobes could be arranged, at some of the listed reference laboratories, for both British and Allied pathologists.

1. Notes on Gas Gangrene: Prevention, Diagnosis, Treatment. Medical Research Council War Memo No. 2. Revised 2nd edition. 1943. London: HM Stationery Office. 6*d*.

2. Ogilvie, W. H. Wound Infection, 1940, London.

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POLYCYTHÆMIA AT HEIGHTS

THE expedition of Barcroft and his colleagues to the Peruvian Andes familiarised us with the idea that natives and newcomers carry a larger number of red cells in their blood to compensate for the diminished oxygen in the atmosphere at 14,000 ft., and thus ensure that the same amount of oxygen is carried to the tissues as at sea-level. This polycythæmia sometimes exceeds that required for compensation and then there develops a set of signs and symptoms strikingly similar to those of the polycythæmia "vera" of normal altitudes—headache, dizziness, dyspnœa on exertion, gastric upsets and cyanosis. This condition was described by Carlos Monge in 1928 and named "chronic mountain sickness"; a characteristic point was that if the patients were taken to a lower altitude—a transition that local geography made rapid—their polycythæmia and their symptoms disappeared. Hurtado[1] has described 8 further cases and discusses its cause and its relation to the classical polycythæmia vera. In all except one of his patients the arterial oxygen saturation was unusually reduced at 14,000 ft. and the polycythæmia might well have been a correspondingly exaggerated erythropoietic response. Search for the cause of the abnormal unsaturation was not easy; radiograms showed accentuated lung markings in 7 of the 8 cases; in 2 these persisted at sea-level even after the polycythæmia had disappeared; in 5 cases the heart was enlarged to the right and the electrocardiogram showed right ventricular preponderance, but this is not an unusual finding in these mountain natives. Hurtado suggests that as the passage of oxygen through the alveolar membrane is dependent on diffusion, and is slowed by any thickening of the membrane, a possible explanation is that fibrotic changes have so reduced the diffusibility of oxygen through the alveoli that the reduced oxygen partial pressure at 14,000 ft. can pass oxygen through only at a subnormal rate, whereas at sea-level the oxygen pressure can still overcome the obstacle; he quotes evidence to show that anoxæmia by itself can cause such a fibrosis. Hurtado does not think there is any connexion between chronic mountain sickness and polycythæmia vera; the oxygen unsaturation of the blood typical of the former does not occur in the latter; the leucocytosis with presence of immature leucocytes and the enlargement of the spleen characteristic of the latter are not seen in the former. This condition serves to remind us who live at what is comparatively sea-level that the polycythæmia sometimes seen in chronic respiratory disease may not be an unmixed blessing for the patient, and may be accompanied by uncomfortable symptoms. Hurtado also hopes that his records will stimulate others to look for the organic changes involved in chronic mountain sickness.

SOCIAL FACTORS IN THE COMMON FEVERS

ONE of the several instruments of research in social medicine is to correlate mortality or morbidity figures of large population groups (obtained from the Registrar-General's tables) with social statistical data—housing, poverty and so on. Mortality figures have increased in precision and the available relevant social data are becoming more varied; sometimes, by the technique of partial correlation, the effect of one social factor can be excluded and that of others thereby revealed. Using such instruments the factors involved in two important "poverty diseases," respiratory tuberculosis and juvenile rheumatism, have been closely studied in the last few years, and now a group of droplet-transmitted diseases in early childhood—diphtheria, measles, whooping-cough and all forms of tuberculosis—have been similarly submitted to statistical analysis.[2] Limiting their data to the London boroughs, Wright and Wright show an association between the adequacy of housing, as judged by the average degree of crowding, and the mortality of young children from each of these diseases, the association appearing to be greatest with measles and least with diphtheria. The usual difficulty arises, that of deciding whether this relationship with housing is due to the fact that housing is a fairly good measure of general poverty, or whether it is due to the dependence of contact-transmission on the degree of crowding; in other words is housing specifically or non-specifically related? The Wrights attack this problem by partial correlation, and they infer that in the case of diphtheria and tuberculosis there are other ætiological factors inherent in poverty besides that measured by housing, and that while the housing factor probably acts through facilitating transmission the other factors in poverty possibly result in lowered non-specific resistance to the infecting organism. On the other hand, in the case of measles and whooping-cough, the statistical evidence does suggest that the economic basis of these diseases is due solely to the effects of overcrowding on transmission. Whether these findings support the view that nutrition is a factor in determining the level of childhood tuberculosis and diphtheria in a community, but not that of measles and whooping-cough, the Wrights wisely refrain from concluding. Indeed their paper illustrates the limits as well as the usefulness of public-health statistics in defining the social causes of ill health. Statistical correlations based on the health and social data from special field-studies can advance beyond these limits; a model of this procedure is provided by the recent analysis of the social factors in rheumatic heart disease made by Daniel in Bristol.[3]

CHEMOPROPHYLAXIS IN GONORRHŒA

SINCE the beginning of the sulphonamide era venereologists have speculated as to whether this group of drugs has any place in the chemoprophylaxis of gonorrhœa; but until recently none of them had been tried for this purpose on appreciable numbers of persons. In April, 1942, Kline and Ryan,[4] two United States naval surgeons, recorded an experiment in which, over a period of eight months, 1000 consecutive men who had run a venereal risk were given 2 g. of sulphathiazole on the morning after exposure and a further 2 g. five hours later. Only one man who carried out the full routine developed gonorrhœa; 2 other infections occurred, but in men who had only had a total of 2 g. of the drug. A further 3 men developed a urethral discharge in which gonococci were not found and which was attributed to improper local irrigation, presumably self-administered. During the same period 79 gonococcal infections developed among other sailors at the station who did not avail themselves of the treatment.

As a contrast to this experimental abortive treatment—for it cannot be called true prophylaxis—a rather more carefully controlled test has been carried out by Loveless and Denton[5] of the United States Medical Corps on a large contingent of negro troops stationed in a fort in Georgia. A group of 1400 of these men were given 2 g. of sulphathiazole on leaving the fort on pass, presumably in the late afternoon or evening. Those taking "station prophylaxis" on their return, which in the US Army includes a urethral instillation of a solution of silver proteinate; received no further drug. All others were given 2 g. on returning to the fort and a further 2 g. next morning. The numbers who received these two different schemes of treatment are not clearly differentiated. The control group consisted of approximately

1. Hurtado, A. *J. Amer. med. Ass.* 1942, **120**, 1278.
2. Wright, G. Payling and Wright, H. Payling *J. Hyg. Camb.* 1942, **42**, 451.
3. Daniel, G. H. *J. R. statist. Soc.* 1942, **105**, 197. See *Lancet*, March 20, 1943, p. 371.
4. Kline, E. F. and Ryan, T. C. *Nav. med. Bull., Wash.* 1942, **40**, 360.
5. Loveless, J. A. and Denton, W. *J. Amer. med. Ass.* 1943, **121**, 827.

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4000 negro troops from the same post, and among these the gonorrhœa rate per 1000 per annum remained at the very high figure of 171. This is a preliminary report; the tables in the article are not easy to follow and it is doubtful whether they would satisfy a statistician, but the authors claim to have reduced the incidence of gonorrhœa among those who took the drug before exposure to a modest 8 per 1000, and that of chancroid from 52 to 6 per 1000. No toxic reactions were noted other than occasional complaints of mild nausea and no cases of sulphonamide sensitivity were reported, though many of the men seem to have had several courses of the drug.

In this country chancroid is a rare disease and even abroad among British white troops the incidence of gonorrhœa is unlikely to approach the figure of 171 per 1000. Moreover, as Jefferiss and McElligott[6] have recently shown, a cure rate of 85–90% may be expected in early cases of gonorrhœa adequately treated for 2–3 days and it is hard to see any great advantage in the method. Apart from the danger of sensitisation (a very real one) there is every reason to suppose that sulphonamide-resistant strains of gonococci will be equally resistant to the drug when it is given prophylactically; and it is not unlikely that resistance can be induced by small doses repeated often. To give sulphathiazole to all and sundry as often as a venereal risk is run may easily prove the reckless discarding of a trump card. It would be interesting to know how the failures reacted to treatment. Among our own Forces a high proportion of risks are run on leave, and the abuses that would follow the distribution of these drugs with a leave pass are obvious: tablets would in many cases change hands and self-treatment for established disease would increase with all its dangers. Though the experiment was probably justifiable in the Georgian fort, the incidence of gonorrhœa in this country does not yet warrant its repetition here; nor, until the drug has been proved to protect against intra-urethral inoculation with a pure culture of gonococci, can its prophylactic efficacy be fully established.

PERITONEOSCOPY

INSPECTION of the abdominal cavity by an endoscopic apparatus is now a method over 40 years old. It has attracted remarkably little attention in Great Britain, though Mr. Milnes Walker and Mr. Lyon Playfair have demonstrated its uses.[7] Early work on the subject was done in Germany and elsewhere on the Continent, and in the past five years a wave of interest has passed over the United States of America.[8] In that time nearly 50 papers on peritoneoscopy have been published there, and though in 1935 there were only two or three peritoneoscopes in America, by 1941 over 300 were in use. The leader of the American crusade is Prof. J. C. Ruddock, of Los Angeles, who has performed over 1500 peritoneoscopies, accomplishing the purpose for which the examination was done in 1473 cases. There was only one death in his series, and English observers recounting their experiences at the RSM last week concurred in finding the method devoid of risk; Mr. Walker and Mr. Playfair speaking as surgeon and gynæcologist, Dr. A. M. Cooke (who prefers to call it laparoscopy) as physician. But it certainly calls for skilled technique, and a careful study of the normal and pathological appearances to be found in the abdomen. Speakers, while warmly advocating peritoneoscopy, were emphatic that its limitations should be realised. Usually it gives a view of the anterior aspects of the liver, stomach, gall-bladder, peritoneum, omentum, parts of the small intestine, and the pelvic organs. Occasionally the appendix can be seen, and the spleen if it is enlarged, though it is usually impossible to determine the nature of the splenomegaly from mere inspection. Material for biopsies (with coagulation of the biopsy site) can safely be taken from the solid viscera. In the United States fresh techniques have been added: internal illumination of hollow viscera such as the stomach, rectum, bladder and vagina has been used to aid inspection; instruments have been designed and used for palpation, cutting, puncture, cauterising, and even suturing; and photographs plain and coloured have been taken. Advances in photography have been handicapped in this country by lack of suitable cameras, but may be expected as soon as appropriate equipment can be obtained. Even if used only for mere inspection and the taking of biopsy specimens there is little doubt that peritoneoscopy deserves more attention here than it has hitherto received.

6. Jefferiss, F. J. G. and McElligott, G. L. M. *Lancet*, 1943, i, 65.
7. Walker, R. M. and Playfair, P. L. *Lancet*, 1942, i, 159.
8. See *Lancet*, 1941, ii, 672; and 1942, i, 540.

BIRTHDAY HONOURS

IN bestowing a baronetcy on Sir John Fraser, regius professor of clinical surgery at Edinburgh, the King has recognised both his distinction as a surgeon and his many public services. During the last war he served in the RAMC and won the Military Cross; and throughout this war his skill and judgment have benefited the Navy, the Army and the Department of Health for Scotland. Lieut.-General Hood, who becomes KCB, has been director-general of Army Medical Services since 1941, during a period of great and successful expansion. With a soldier's capacity for decisive action he combines a doctor's open mind, and as the medical services of the new army have taken shape and proved themselves in the field, confidence in their direction has steadily risen. The knighthood for Mr. H. L. Eason shows appreciation of valuable work over many years, especially in medical education. Having served in the last war as consulting ophthalmic surgeon to our Forces in the Middle East, he has since been superintendent and dean of the Guy's medical school, principal of the University of London (1937–41) and president of the General Medical Council. To these, and to our other colleagues whose names appear on p. 750, we offer congratulations.

The MEDICAL REGISTER for 1943, which has just reached us, contains 69,428 names, being 2436 more than in the previous year, and 4749 more than in the 1941 register. But this large and welcome increment is by no means all due to recent qualification; during the last two years 1750 names have been added, "for the duration," to the Foreign List and 294 names to the Colonial List, because their bearers have passed tests accepted by the General Medical Council under the temporary registration orders of 1940. That accounts for 43% of the 2-year increment. Another small factor on the plus side is the natural reluctance to remove names from the register just now, merely on account of failure to confirm whereabouts; and on the minus side the figure of removal on evidence of death is creeping up noticeably, partly by reason of the ageing of the medical population. Nevertheless, where these and other adjustments have been made there is no gainsaying the fact that 4743 men and women qualified for registration in the United Kingdom during the two years, 2637 last year and 2106 in the previous, and that last year 1663 registered in England, being at least half as many again as the average for the last twenty years.

THE house committee of the London Hospital have decided to set up a large orthopædic and accident centre immediately, although it will not be possible to build a complete department until after the war. Mr. R. W. Watson-Jones, of Liverpool, has accepted their invitation to become honorary surgeon to the hospital and director of this orthopædic and accident department. He will take up his appointment on Oct. 1.

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Special Articles

GENERAL MEDICAL COUNCIL

SUMMER SESSION, MAY 25–28, 1943

Charges against Practitioners

The council directed the erasure from the Dentists Register of *Ivor Llewellyn Edmunds*, LDS (1935), who, in November last, had been sentenced to hard labour for falsification of accounts and embezzlement. The council also directed, in his absence in Wandsworth gaol, the erasure of *William Alexander Stevenson Welsh*, MRCS (1927), who had been summoned before the council in November, 1942, and February, 1943, but had not attended. He had a conviction for drunkenness while in charge of a car, and four for obtaining money by false pretences, and had been cashiered from the RAMC for giving worthless cheques. To the original charge was now added a conviction on March 12, 1943, for obtaining £15 by false pretences.

IRREGULAR CERTIFICATION

The case of *Charles Liddell McHarg*, registered as of 1, The Poplars, Abertillery, Mon., MB Glasg. (1924), summoned to appear on the following charge:

That being a registered medical practitioner:

1. You gave or purported to give certificates in your professional capacity in the following form for subsequent use for administrative purposes under arrangements made by the Minister of Health in exercise of powers conferred upon him by the Civil Defence Act, 1939, in the following cases and on or about the following dates:—*Form of Certificate.*—"Government Evacuation Scheme; Home Nursing of Unaccompanied Evacuated Children; Certificate. I hereby certify that .... (name of child) at present billeted on .... (name of householder) .... (address) is suffering from .... (nature of illness) and is therefore confined to the billet; that the conditions of the billet appear to me to be suitable for the adequate care and nursing of the child (including the prevention of the spread of any infection); and that such care and nursing are likely to necessitate a material increase in the costs of maintenance, or in the care and attention required. (Signed) .... (name of practitioner) (Date) .... This certificate should be sent by the householder to the Medical Officer of Health of the Urban District in which the billet is situated."

Particulars of 11 cases followed, some 427 certificates being involved. The charge continued:

2. You stated or implied in each of the said certificates given or purporting to be given by you during the said periods that on the material date:—Each of the said persons, being an unaccompanied evacuated child billeted on a householder, was suffering from a specific disease or bodily disablement and was therefore confined to the billet; the conditions of the billet appeared to you to be suitable for the adequate care and nursing of the child (including the prevention of the spread of any infection); and such care and nursing were likely to necessitate a material increase in the costs of maintenance, or in the care and attention required. Whereas in fact, in each of 10 cases, the child in question was not at any time during the period when you gave the said certificates confined to the said billet by illness; and was throughout the said period in regular attendance at a public elementary school, except for half a day or occasional absences; while no child named Mary Simpkins was on the date when you gave the said certificate billeted on the householder on whom you stated in the said certificate that she was billeted, or on any other householder in the Abertillery Urban District.
3. You did not see or examine the said Audrey Bater, Judith Cowell, Kramer, Eileen Spicer, Fred Ellesley, Mary Ellesley, Lilian Simpkins, Rose Simpkins, Frank Simpkins, Marion Simpkins, or Mary Simpkins at any material time.
4. You did not make any or any proper professional inquiries before you gave the said certificates.
5. The said certificates were untrue, misleading, or improper within the meaning of para. 1 of the Warning Notice issued by the General Medical Council dated June, 1933.
6. In support of claims for remuneration in respect of treatment which you purported to have given to the said children, you wrote letters dated Oct. 9, 1941, Jan. 7, 1942, and April 10, 1942, to the secretary of the Local Medical War Committee with which you enclosed lists purporting to be lists of evacuated children treated by you during the quarters which ended on Sept. 30, 1941, Dec. 31, 1941, and March 31, 1942.
7. You included in the said lists in respect of these quarters the names of the said children.
8. None of the said evacuated children had in fact been treated by you at any material time, and the statements as to the said children in the said letters written by you and in the said lists enclosed therewith by you were to your knowledge untrue.

The complainants were the Welsh Board of Health. Dr. McHarg was represented by Mr. Oswald Hempson, solicitor, instructed by the Medical Defence Union. Mr. Gerald Howard, counsel, instructed by Mr. F. P. Winterbotham, solicitor to the council, was accompanied by Mr. Michael Bull, counsel.

Under the Government scheme, Mr. Howard said, if any unaccompanied evacuated child was ill and the doctor thought it desirable to treat the child in its billet, the doctor could give the certificate set out in the charge. Normally the certificate should go to the medical officer of health, but owing to pressure of work in Abertillery it had become the custom to trust the doctor implicitly, and any relative of the householder could take the certificate to the billeting officer and collect 5*s*. on it. A Mrs. Russell and a Mrs. Baker, who had at one time quite properly got certificates, noticed the possibility of getting certificates for children not billeted on them; they had collected something over £100 and had been prosecuted and sentenced to 6 months' imprisonment. It was in respect of these certificates that the present charge was brought. They had been issued over a period of 9 months, and in some cases more than one a week had been issued for one child. Dr. McHarg had never visited any of the billets or seen any of the children, and in many cases the body of the certificate had been filled in by another hand than that of the signature. In addition, the doctor had to make claims for his own remuneration, a central fund being distributed pro rata among the doctors of the district. Dr. McHarg had for the three material quarters sent in claims in respect of 10 children whom he had not seen; the actual sum obtained was small.

Mr. Howard then went over the facts of each case, pointing out that the children seemed to have had most unfortunate runs of illness, if the certificates had in fact been true. The women on whom the children had been billeted would testify that they had never been ill and that Dr. McHarg had never attended them. In several cases the addresses given on the certificates were incorrect. Rose Simpkins had left Abertillery in January, 1942, but the certificates had continued until May. Apparently there never had been any such person as Marion or Mary Simpkins in Abertillery at all; she had been certified as suffering from mumps, scabies and other illnesses in 43 certificates. Even the most casual inquiry must surely have made this doctor aware that very peculiar things were happening. It seemed incredible that any practitioner could have signed that document 427 times in 9 months with no knowledge whatever of the facts stated.

Mr. Harold Powell, finance officer to the urban district council and formerly chief billeting officer in Abertillery, explained the scheme and its working. Owing to the preoccupation of the medical officer of health with extra war duties, absolute reliance had been placed on the doctor's certificate. The 5*s*. could never be paid without the production of a certificate. Cross-examined by Mr. Hempson, he agreed that the medical men, so far as he knew, had no idea that the supervision of billets had been abandoned. He was not aware that these certificate forms were handed out to the women in packets; he admitted that had been stated in the prosecution of the two women. He remembered that a number of other doctors had been involved in similar deceptions. He identified a schedule of irregular certificates made out by the Ministry of Health as a result of an extraordinary audit, and found in it the name of every doctor in the area. All of them had been "caught" by these women to a greater or lesser extent. There had been over 1500 official evacuees and many others; Abertillery had been packed and there was no isolation hospital, and thus no alternative to treatment in billets whatever the condition. He was not aware that the Ministry had ruled that the phrase "confined to billet" was to be interpreted as "absent from school." Dr. McHarg had been in the area for many years, was a very busy practitioner, and would know the houses well without visiting them. It had been necessary to allow considerable latitude in the collection of allowances by friends. It had been a common thing to see queues waiting outside doctors' houses because the waiting-rooms were full.

Mr. F. J. Dayton, chief billeting officer, said the authorities relied entirely on the doctor who sent the certificates. He knew that the MOH was not carrying out the duties laid on him by the order, but had not at the time known that foster-parents were obtaining certificates in batches.—Four foster-mothers testified that the children named had been under their care and had never been attended by the doctor, or had any certificates from him.

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Dr. McHarg described how alike the houses in Abertillery were and how well he knew them. Between 2000 and 3000 children and many adults had suddenly appeared in Abertillery and the medical men had had enough work to do before that. Conditions in his surgery had been terrible even before the evacuation, with queues outside the waiting-room. From December, 1941, to May, 1942, he had two daily surgery periods each lasting 2 or 3 hours and in between had to get his visits done and give anæsthetics at the hospital. When a collier came to him (as often happened) he might have six notes or certificates to write out for him, as well as all the panel work. He had always been extremely strict in giving certificates and had never issued one without examination. Very many patients at this period had to be treated at home when they should really have gone to hospital, as there was no isolation hospital and the general hospital had been full before the evacuation. He had not been aware of the arrangements for payments to foster-mothers. The two women had seemed very respectable. The certificates for scabies were given to keep the children from school, not to keep them in the house or in bed. He did not know what the Ministry understood by "confined to billet." He had been told that each child had been to a clinic and seen a doctor there. He had relied on the foster-parents for the names of the children. He was satisfied that the children presented to him were in fact suffering from the diseases he certified. He had had no suspicion and had received no payment. He had never signed a certificate in advance. The forms had usually been presented to him ready filled in, just requiring signature. The pressure of work at the time had been unbelievable. It was the duty of the local authority to ensure that women were not paid twice a week for one child. Two of the certificates were signed by his wife, a qualified dentist; she had let her name lapse from the Register at the time of her marriage in 1928. In reply to the President he said his defence was that it was a case of impersonation. Two women had brought all the children, attributing them to various households. He understood that all the cases had been checked up by the medical officer of health, and had relied on that. He did not think confinement to the billet was a suitable treatment for scabies; the term was a loose one. Nevertheless he had certified for extra money for nursing in billets for scabies. If he had satisfied himself of the suitability of the billet, as he should have, he would have seen the real children in the billet and no deception would have been possible.

Mr. Hempson pointed out that there was not a shred of evidence that respondent had not examined the children on the dates given. He had been presented with filled-in forms, showing the name, address and disease, and had every reason to suppose that that form had come from official sources. He confirmed the diagnosis given by his own examination and found it correct. Since it proved correct, he had assumed that it had been entered by a doctor. Was it really his duty to go round and confirm the name and address in each case? Even if the billet had been unsuitable, there was nowhere else for the child to go. There was bound to be increased work for the foster-mother in all these cases. He had not devised the form of certificate, which had to be signed as a whole. Most children were taken to the surgery by neighbours because most of the foster-mothers were working and had no time to spare. Dr. McHarg was a simple-minded, trusting individual. There was no suggestion of gain in what he had done. He could never have foreseen such slackness at headquarters. The wrong naming of the child was not his untruth. His remuneration was for work which he had in fact done, for he had treated 11 children, and seen them repeatedly. To the best of his knowledge and belief the documents he had signed were true.

The council directed the erasure of his name.

Another name erased for irregular certification was that of *William Vincent Saint John Sutton*, registered as of 297, Highway, Shadwell, E.1, LRCPE (1904), summoned to appear on the following charge:

That you were convicted (in the name of William St. John Sutton) at the Central Criminal Court at its session commencing on Jan. 12, 1943, of signing and giving medical certificates to two persons in His Majesty's Forces, and to a person engaged in the National Fire Service, having reasonable cause to believe that the said certificates were likely to prevent or interfere with the performance of their duties, and were ordered to be imprisoned for nine months.

Dr. Sutton was not present.

FALSE ENTRIES IN VISITING DIARY

The case of *Paravasthu Gopaula Sawmy*, registered as of The Dragon, Warrington Road, Whiston, Liverpool, LRCPE (1928), whose name was erased after evidence on two charges had been heard. The complainant, Mr. P. G. B. Griffin, LDS, had sued Dr. Sawmy for the return of a loan of £400; the latter had counterclaimed for £362 5s. for professional services to Mr. Griffin and his family. The first charge alleged that, to support this counterclaim, the respondent had falsified entries in his visiting diary so as to show that he had attended Mr. Griffin between April 1 and Oct. 31, 1939, and Mr. Griffin's daughter between April 15 and June 21, 1941, whereas he had not in fact attended them during those periods. The second charge concerned a letter written by Dr. Sawmy to Mrs. Griffin's solicitors on Jan. 2, 1942, describing her condition in February or March, 1936. It was alleged that Dr. Sawmy had substituted for his original letter a second letter, bearing the same date but written later, which made statements which he knew to be untrue.

Complainant and respondent, it was said, had met in 1928 and had been friends and colleagues on a hospital staff; Mr. Griffin did dental work for Dr. Sawmy, and Dr. Sawmy rendered medical services to Mr. Griffin, without payment on either side. In 1939 Mr. Griffin lent Dr. Sawmy £400. In September, 1941, Mr. Griffin left his wife, who accused him of striking her and consequently consulted her solicitors. Mr. Griffin (and his son) went to live with Dr. Sawmy. Dr. Sawmy, it was said, had reported on Mrs. Griffin's condition on Jan. 2 and Feb. 12, 1942, giving different accounts of the injuries. Between those dates Mr. Griffin and Dr. Sawmy quarrelled and parted. The former then issued a writ for the return of the £400 lent. Dr. Sawmy entered a counterclaim for professional services and for board and lodging. This litigation was settled, Dr. Sawmy admitting the claim and withdrawing his counterclaim.

There was a sharp conflict of evidence before the council. The main relevant testimony was as follows. The disputed entries in the diary indicated medical attendance on Mr. Griffin almost every other day from April to September, 1939. Mr. Griffin admitted having been treated for lumbosacral arthralgia between January and March—perhaps a third of the number of visits shown in the diary. In February he bought an infrared lamp and terminated his treatment by Dr. Sawmy. The purchase of the lamp was confirmed by his cheque-book counterfoil and by a statutory declaration from the electrician who sold it. As regards Mr. Griffin's daughter, the diary showed details of the slow recovery of a fractured ankle sustained by her in April, 1941. Mr. Griffin said she had no such injury in that month; her accident occurred in August, 1940, when she was doing harvest work in her university vacation. The farmer for whom she had worked gave evidence that the ankle injury occurred at his farm in August, 1940, the only time when she had stayed there. An affidavit from the registrar of Liverpool University proved that during April, 1941, she had been attending the dental school. As for the counterclaim for board and lodging, Mr. Griffin said he paid Dr. Sawmy £16 a month; he paid in notes and could produce no cheque-book counterfoils or receipts for these payments.

On the other side, Sister Rowson, a state-registered nurse employed by Dr. Sawmy, said that she entered his service first on April 1, 1939, and that Mr. Griffin had treatment frequently after that date. Miss Griffin's accident, she said, had not happened in August, 1940. She remembered a telephone conversation fixing the sum of four guineas each for the board and lodging of Mr. Griffin and his son. A postmaster said that the doctor was attending Mr. Griffin regularly all through 1939. The son-in-law of the landlord of a hotel where Dr. Sawmy had a consulting-room said Mr. Griffin had been a frequent visitor for treatment in April, 1939, the appointments being arranged over the telephone by Sister Rowson. Dr. Sawmy's evidence was a vigorous denial of the charges and a confirmation of the challenged

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entries in the diary. The council recorded the decision already stated.

CONVICTION FOR MISDEMEANOURS

The case of *Christopher Whitehead*, registered as of Greystone, Co. Wicklow, LRCPI (1926), summoned to appear on the following charge :

That you were convicted of the following misdemeanours :—

1. On June 29, 1942, at the Leicester City Police Court, of being found drunk in Granby Street, Leicester, and were fined 10*s.* ; and
2. On March 17, 1943, at the Petty Sessional Division of Dynas Powis sitting at Penarth, of obtaining on Oct. 16, 1942, at Dynas Powis by false pretences from Charles Allansen the sum of six pounds, in that you exchanged therefor a banker's cheque drawn on the Blaenavon Branch of the Midland Bank Limited in favour of the said Charles Allansen and dated Oct. 15, 1942, for the payment and of the value of six pounds, well knowing at the time that such cheque would not be met by reason of the fact that your account at the said bank was closed, and were sentenced to four months' imprisonment, two other charges of a similar nature committed at Pontypool on June 23, 1942, and June 29, 1942, respectively being taken into consideration.

Respondent was accompanied by Mr. O'Sullivan, K.C., instructed by Messrs. Donald, Darlington and Nice, solicitors. In evidence, he declared that he had not known that the account was closed. The council found the facts proved but did not remove the name from the Register.

OTHER BUSINESS

The Examination Committee presented the annual examination returns, and proposed to arrange as soon as possible for inspection of qualifying examinations not already being inspected.

The Pharmacopœia Committee reported on the sale of the British Pharmacopœia and addenda, and on the work of the Commission and its committees. The sixth addendum was now complete, containing ointments with an emulsion base, and monographs on new drugs. Consultation with the USP revision committee continued actively. The committee thought that a complete new Pharmacopœia should not be published during the war.

In re-electing Mr. M. Heseltine as registrar for another year, the council paid tribute to his services and particular helpfulness in exceptional circumstances.

BIRTHDAY HONOURS

THE honours list issued on June 2 contains the following names of members of the medical profession :—

Baronet

Sir JOHN FRASER, KCVO, MC, CH M
Regius professor of clinical surgery in the University of Edinburgh, honorary surgeon in Scotland to the King.

KCB (Military)

Lieut.-General ALEXANDER HOOD, CB, CBE; MD
Director-General of Army Medical Services.

Knights Bachelor

HERBERT L. EASON, FRCS
President of the General Medical Council.

JOHN HUTSON, OBE, MB
For public service in Barbados.

CB (Military)

Air Vice-Marshal FRANK C. COWTAN, MRCS, KHS
Surgeon Rear-Admiral WILLIAM H. EDGAR, OBE, MD
Major-General ALISTER A. C. MCNEILL, MB, KHS, IMS
Major-General OSWALD W. MCSHEEHY, DSO, OBE, MB, late RAMC

CMG

WILDER G. PENFIELD, MD, FRS
Head of the Neurological Institute, Montreal.

CIE

Rai Bahadur ANIL CHANDRA BANERJEA, MB
Director of public health services, UP, India.

Brigadier HENRY C. D. RANKIN, OBE, MB, DDMS, GHQ, India.

CBE (Military)

Air-Commodore HARRY A. HEWAT, MB
Brigadier WILLIAM E. TYNDALL, MC, MB, RAMC

CBE (Civil)

ALBERT E. ARCHER, MD
President of the Canadian Medical Association.

JAMES B. COLLIP, FROP, FRS, FRSC
Professor of biochemistry in McGill University, Montreal.

GEOFFREY JEFFERSON, FRCS
Consultant adviser to the Ministry of Health in neurosurgery, and professor of neurosurgery in the University of Manchester.

OBE (Military)

Lieut-Colonel GEORGE J. ALEXANDER, MC, FRCSE, RAMC
Lieut.-Colonel FREDERICK K. ESCRITT, MRCS, RAMC
Surgeon Commander WILLIAM A. HOPKINS, MD, RN
Surgeon Captain A. MCCALLUM, MD, RCNVR
Lieut.-Colonel CECIL H. PLAYFAIR, MD, RCAMC
Major KHAN MOHAMMED SANA, IMS
Colonel IVAN S. WILSON, MC, FRCS, NZMF

OBE (Civil)

WALTER M. ASH, FRCSE
MOH for Derbyshire.

ROGER CALLEJA, MD
Senior MO, Nyasaland.

PETER S. CAMPBELL, MD
MO, public health department, Nova Scotia.

DAVID S. DAVIES, FRCSE
Physician, HM legation, Tehran.

ROBERT D. DE FRIES, MD
Of Toronto, Ontario.

Surgeon Captain GERALD S. HARVEY, MB, RN retd
Senior instructor (medical), Ministry of Home Security School, Falfield.

Major ROBERT T. HICKS, MRCS, IMS
Civil surgeon, Cuttack.

ERNEST V. HUNTER, LMS
For missionary medical work.

ALBERT LESAGE, MD
Dean of the faculties of medicine and professor of clinical medicine in the University of Montreal.

EDWARD S. LITTLEJOHN, MRCS
Medical superintendent, LCC Certified Institution, Epsom.

PATRICK F. MCFARLAN, FRCSE
Surgeon to Stirling Royal Infirmary.

Hon. WALTER S. MACLAY, MD
Medical superintendent, Mill Hill Emergency Hospital.

WILLIAM J. P. MACMILLAN, MD
Of Charlottetown, Prince Edward Island.

CHINTAMAN G. PANDIT, MB
Director of the King Institute, Guindy.

Lieut.-Colonel JELAL M. SHAH, MBE, MRCS, IMS retd.
Superintendent of J.J. Group of Hospitals, Bombay.

ISO

HUGH H. COWPERTHWAITE, MD, MS
Visiting surgeon, department of public health, Newfoundland.

MBE (Military)

Captain CLIVE O. BARNES, MB, RAMC
Captain C. F. EGAN, MD, RCAMC
Captain RONALD E. JOHNSON, MB, RAMC
Lieut-Colonel JOHN C. RICHARDSON, MD, RCAMC
Surgeon Lieutenant CHARLES G. SCORER, FRCSE, RNVR
Major ARTHUR C. SINGLETON, MD, RCAMC

MBE (Civil)

Captain JOHN BREBNER, LMS, IMS
Civil surgeon, Chittagong.

WILLIAM K. COLBECK, MD
Of Welland, Ontario.

PRESCOTT A. CREELMAN, MD
Head of the tuberculosis service, Prince Edward Island.

NAIF A. HAMZEH, MD (honorary)
MO, Government Hospital, Haifa.

PAUL C. LAPORTE, MD
Of Edmundston, NB.

MILTON A. S. MARGAI, MB
MO at Sierra Leone.

KALIDAS MITRA, MB
Officer i/c of the Bihar Nutrition Scheme.

Colonel MUHAMMAD J. QURAISHI, MRCS
Chief MO, Rampur State.

AGNES M. SWAN, MD
Chairman of the Manitoba Nutrition Committee.

ROWLAND P. WILSON, FRCSE
MO i/c Giza Eye Hospital, Cairo.

Kaisar-i-Hind Medal

GALEN F. SCUDDER, MD
Scudder Memorial Hospital, Ranipet, Madras.

In Yenan, NW China, new uses are being found for the spirogyra found in the river Yen. The alga is being successfully used in paper-making, and, from a suggestion by a Russian Dr. Arov, as a substitute for cotton-wool for dressings in the same way as sphagnum moss is used here ; its absorbing capacity is said to be seven times that of cotton-wool.

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In England Now

A Running Commentary by Peripatetic Correspondents

WE have had nightly raids lately and there have been some casualties. What has interested me most is that out of 12 patients admitted to one hospital, all were cut by glass, some losing eyes. Another important point, I think, is that one medical officer should go to bed so that he is fit to attend to the casualties first thing in the morning. The recovery of a few casualties may have been prejudiced because there has been nobody to watch them very closely after operation—the whole surgical team have simply gone to bed. Finally, the blood-pressures in nearly all cases are very low, although they are not truly shocked.

* * *

"There's the telephone!" With the insistent demands, legal and other, to economise in the use of petrol, the telephone has come into greater use than ever before, less by the doctor himself than by patients who have learned its misuse, and can be so exasperating that the doctor at times wishes its inventor had never lived. Whether sleeping, dressing, feeding, listening-in or auscultating some stripped patient, the peremptory command must not be disobeyed. Who among us is fortunate enough not to be called from a well-earned meal to listen to some trifling question; or perhaps to find a subscriber trying to get the butcher, the baker or the candlestick-maker at the doctor's number? To some people this telephoning seems to have become a sort of hide-and-seek; they try to "just catch the doctor" at his meal-time. By the time he gets back to the table the half-consumed plateful only nauseates him. In these days, when one doctor may have to do the work of several absent on Service, his exhaustion of body and mind has to be experienced to be believed; a 16-hour working day is rare in any other calling. It was the last straw when a colleague of mine was recently rung up at 11 PM to be told that the load of manure which he had never ordered had been duly dumped—just inside his front gate. Much of this load, by the tramplings of three consulting-hours, buried itself in his waiting-room and consulting-room rugs.

If misuse of the telephone is on the increase, what is the remedy? Cure seems to be out of the question. A remedy would be to live away from the practice, and work in an orderly way from an office, in office hours. Urgent calls out of hours could be filtered through to the doctor as and when they arose. The only colleague I ever knew who lived a life of peace did so because he refused to possess a telephone, and so was not possessed by it. He did not think his patients suffered any inconvenience.

* * *

When one is a student one wants to be qualified, and when qualified these days one's great desire is to join the Forces. Many of us regard the Navy as the cream—the uniform is attractive and the gold braid with red stripe looks good. One does not have to have the square shoulders expected of the soldier; on the contrary, kyphosis and an ataxic gait are nautical. The medical examination on entry is not searching; vision is important but any self-respecting candidate should be able to learn Snellen's type off in a night. It is well to avoid having an alcoholic aroma on the breath while being examined as this tends to make your brother medico jealous and even vicious. The great thing is to pass a clear urine; the slightest trace of albumin will damn you as an advanced Bright's disease. When once you've been appointed to a ship (never "boat," by golly,) and it will probably be a destroyer, your troubles really begin. You rush aboard and while saluting the Quarter Deck (as you've been told to) you miss your footing and probably receive a Pott's fracture. This is not a good start to Naval life but everyone laughs like hell, including yourself, and the incident is forgotten. Do not think that you are at all important to the life of the ship—in fact, if the sick-berth attendant is aboard they'll probably wonder why you've come at all. Having made the impression that you mean to stay, you visit the sick bay (if any). If there's no sick bay, or if it is being used for the stowage of something else, your cabin must be used for the purpose, and very pleasant it is to sleep with the odour of 'Dettol' around you. When you do see the sick bay your first impression is that you are in a small cupboard by mistake but a couple of empty medicine bottles on the deck make you realise that this is where the healing art is practised. It will then be time to have a gin and stop work for the day. Some sort of time-table must be evolved such as "0930 See the sick; 0933 Retire to the wardroom for the rest of the day." Minor injuries which occur after this time are liable to be a nuisance, and a notice saying "Come back when it's septic" displayed over the door of the sick bay will save a lot of time. Proper medical interest is not really aroused until you go to sea. Then you will, if you are normal, have the joy of experiencing the symptoms of hyperemesis yourself. Like everything else unpleasant you will be expected to laugh it off. To all and sundry you are the "Doc," though if you show a light on the upper deck at night you will be described differently. Favourite alternatives are Quack, Pox Doc and Horse Doc. So you get more respect than you deserve. The commonest complaint with seamen is a stoppage of the bowels—anything over a fortnight should be treated routine; anything over a month should be referred to the gunner. But it's not such a bad life, and only the other day one of our profession got the Albert Medal in gold, so there's always hope.

* * *

When visitors were expected to tea, we children used to go down the lane, squat in the bracken, and watch them pass. We never did anything, but it gave us a sense of power to watch them at close quarters without them knowing, especially when we met them later. I think this must be a very old instinct of humanity's and is the charm of bird-watching, spying, and some types of reading. I have never lost it, and though I don't often squat in bracken now I get a lot of pleasure in watching unsuspected the eccentricities of my fellows. My principal, for instance, is a numerical addict. The first time I spotted this was when I saw him sitting in his car at the side of the road. I went back and asked him if he had a puncture. "No, no," he answered vaguely, obviously in a state of ecstasy, "just admiring the view." Then I noticed his mileage was 9999·9. After that I detected him in the vices of paling-touching and pavement-line avoidance. He goes to church, but I suspect chiefly to juggle with the hymn numbers and count the panes in the windows. At first I thought that this, at any rate, is an entirely human characteristic; animals don't do that sort of thing. Then the great tit, the thrush, the metrically galloping horse and the rhythmically swaying polar bear rose to confute me. Obviously it is a form of atavism, a harping back to the jumbled harmonies that man and beast learnt from the brook and the wind in the boughs, in which numbers and words were undifferentiated. Schizophrenics sometimes blend both beautifully, and there is a stage of childhood to which patterns of numbers and puns are exquisitely wondrous. It is the infancy of mathematics, and therefore adults who display it have no mathematical ability, but children who write verse will write good prose later. On the fourth of March, when he could write "4.3.43," my principal was in great fettle, and on "3.4.43," a lesser saint's day, he broached a winchester of Syr. Narciss, stimul. (which is very expensive) for his panel patients. The fourth of April next year will be his greatest day in eleven years and will probably have several vigils. I shall wait till then to ask for the hand of his bony daughter and/or the half of his practice.

* * *

I am all for getting to know foreigners better though I have long doubted whether on closer acquaintance we shall find that they differ essentially from our noble selves, for we all belong, I understand, to the species homo (self-styled) sapiens and can interbreed without throwing mules. A recent advertisement in *Life* has, however, shaken my belief in our kinship with the gallant Americans. A certain shaving cream which has, needless to say, all the virtues that pumice stone lacks is puffed as being ideal for "The One Man in Seven who shaves Daily." Uncle Sam himself affects a goatee; but are there, in fact, some 50 million bearded—or, worse, fuzzy—chins in the Land of the Free?

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Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

Mr. ATLEE'S announcement of the casualties to all ranks of British Empire Forces during the first three years of war shows how great is the share of the United Kingdom. Out of total casualties of 514,993 no less than 275,844 are from the United Kingdom, and of the 92,089 killed the share of the United Kingdom reaches the high proportion of 73,477. These figures include overseas personnel serving in United Kingdom forces, especially those from Newfoundland and S. Rhodesia; but the proportion of these, although important, does not detract from the significance of the total. The wounded from the United Kingdom are 50,163 out of a total of 88,294 and the prisoners of war 76,801 out of 107,891. The largest figures are those of the missing—226,719 out of the total of 514,993. Great as these casualties are, they have not overwhelmed the medical services; and in the three years under review and in the period since September 1942, which is of course not included, the medical services, and especially that of the Army, have had the opportunity of adapting themselves to modern war.

At the debate on the war situation which will be held now that the Prime Minister has returned from the USA and North Africa further information on casualties caused by illness may be given, and these should be equally reassuring.

The House of Lords has had a full-dress debate on what Lord Derwent called "the medical provisions of the Beveridge plan." Actually there are no medical provisions in the plan, as Lord Snell pointed out when he quoted paragraph 428 of the report to the effect that "the problem of the organisation of a complete health service is outside the scope of the Report." What the report said was that one of the three fundamental "assumptions" which were necessary to carry out its social security proposals was a comprehensive and unified medical service, the two other assumptions being children's allowances and the maintenance of full employment. But Sir William Beveridge expressed no opinion on such matters as free choice of doctor, group or individual practice, or the place of voluntary and public hospitals in a national scheme. It would be better perhaps to describe the Government's medical scheme when it does emerge from the many consultations and meetings as the Ernest Brown scheme, for the Ministry of Health have been working on it for over a year and a half. Lord Dawson made it clear that the medical profession had not neglected this subject of a comprehensive medical service. They had urged it in 1929 when the Local Government Bill was going through Parliament and had been trying ever since to convince governments of the need for coördinating medical services. There emerged from the debate the idea of larger local government areas, and Lord Dawson would add to the administrative authority of such a body an advisory council drawn from the staffs of local government and voluntary hospitals—not all of whom would be medical men—and from the health services.

Sir Charles Wilson, who recently took his seat as Lord Moran, chose this debate to make his maiden speech. He urged that all activities concerned with health should come under one department and not under six as at present, and advocated a medical council to help the Minister of Health in framing his policy. This council, if it could act both as an appointments bureau and a court of appeal, would help to overcome the profession's objection to becoming employees of local authorities. Doctors working at special centres built for the purpose, 8 or 9 together, "would breathe again that atmosphere of their student days in the wards."

As the situation is now, representatives of the profession are consulting with the Minister of Health and the field is open for proposals from either side. Some form of unified and comprehensive medical service is practically certain, the question of how and when remains to be settled. What is clear is that the profession must demand a large share of responsibility in the working of the scheme. A medical council to advise the Minister and medical councils to advise the regions are needed. Indeed, there should be a parallelism of national, regional and local administrative organisations and advisory medical councils at each level of government.

FROM THE PRESS GALLERY

Beveridge Report and Medical Planning

IN the House of Lords on June 1 Lord DERWENT moved:

That, in view of the fact that the medical provisions of the Beveridge Plan, as it now stands, concerning the future status of doctors and the medical treatment of the population in general do not appear to be designed to further the best interests of British medicine or of the population, His Majesty's Government should not adopt them without careful examination.

The medical provisions of the report, as set out in assumption B, were, he suggested, virtually a trojan horse which the Ministry of Health were attempting to introduce into the camp of the medical profession, and neither the medical profession nor the public would stand to gain by such a procedure. Lord Derwent had been prompted as a layman to raise this matter because of his solicitude for the future of British medicine and his anxiety for the common everyday Englishman. If the Government were to turn the medical profession into a band of salaried functionaries—what he hardly hesitated to call State lackeys—not only was an ancient and honourable profession going to be degraded and thwarted, but the everyday citizen was no more going to get a square deal than he was himself. The whole tenor of the medical provisions of the Beveridge report, and of what had leaked through to the public about the conversations and negotiations between the Ministry of Health and the medical authorities, showed that there was great danger that the Ministry of Health would like the hospital doctor and the general practitioner to become a functionary. The medical profession had long recognised the need for improvement in the medical services of the country and they were more than willing to collaborate in many reasonable scheme. But the Government's present intentions seemed to encourage what Lord Halifax, quoting Hitler himself, had called "the saving doctrine of the nothingness and insignificance of the individual human being." If they were carried out Lord Derwent considered that the British public was being "sold a pup."

REITERATED PLEA FOR FREEDOM

Viscount DAWSON OF PENN agreed that comprehensive medical service was no new subject to the medical profession. It had been under consideration since 1920, and in 1929 when the Local Government Bill was going through the leaders of the profession did their best to persuade the Ministry of Health to lay the foundations of such a service but found them a stiff-necked generation—obstinate and without vision. It was not till the Beveridge report came out that the idea was put on the political map. After a rough passage in the House of Commons the Government were accused by their own followers with not being serious about social security. So they had introduced a state of haste and hustle into what should be a gradual process spread over four years. They expected the whole medical profession to be turned upside down in six weeks.

The attitude of the social security scheme to a comprehensive health service, Lord Dawson pointed out, was different from that of the medical profession. The report laid down that the primary interest of a ministry of social security was in finding a health service which would diminish disease by prevention and cure, and would ensure the careful certification needed to control payment of benefit. It was the duty of the medical profession to devise the best health service to improve the health of the nation. It would be disastrous if doctors were regarded as agents to control benefit in the interests of the social security fund. The bias of the doctor might sometimes be in favour of his patients; but some machinery like an appeal board would meet that difficulty. In Lord Dawson's experience doctors far more often dealt with patients who went back to work too soon than with laggards who lingered lazily on.

The idea of a comprehensive medical service fired the imagination. Its foundations should be truly laid upon the rock of agreement and not on the sands of dissension. Medical practice was buried in the age-long customs of this country, engaging not only the reason but the

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emotions of the people. Let us not, Lord Dawson urged, pull up these roots till we were sure we had something good to put in their place. It was our business now to lay the foundation of the scheme and to his mind the design was clear. First preventive and curative medicine must be brought into a single service, and both must occupy an important place in medical education.

As a second foundation he saw a pattern of health and interrelated hospital services distributed according to the needs of the population and based on local authority and voluntary hospitals working in coöperation. The administration of these areas was the first fence. Lord Dawson admitted local government in some form to be the seat of the ultimate administrative authority. On the other hand the voluntary hospitals demanded their partnership, and the medical profession would refuse to accept such administration unless local authorities were guided by representative expert bodies. Freedom for initiative and individual responsibility were the life blood of the profession. He proposed that the health authority in each area should have at its elbow an advisory council of representatives of staffs of local government and voluntary hospitals, a considerable proportion of whom would be medical men. There, in his judgment, lay a solution of the problem. The medical profession would support the proposal that health services and hospitals must be referred to a larger health authority corresponding to each area. He considered that the principles of health and hospital authority should be laid down by Whitehall. These area advisory bodies would bring together the leaders of hospital and health services, both local government and voluntary, and make them colleagues in a common cause. These foundations were enough to begin with. In his judgment two years of patient work and statesmanship would be needed to bring about agreement. Then they could try to build a superstructure in the light of accrued experience. To attempt anything more than these foundations now would be asking for trouble. Meanwhile hospital and consultant services would be paid appropriate salaries and serve on a whole or part-time basis according to choice. In hospitals every patient would have the same essential treatment, but it would be wrong to have a dead level of accommodation and amenities.

The Minister of Health had talked about health centres dotted about the country, although they had never been put to the test of experience. Lord Dawson believed that these centres opened a big field of usefulness, but it would be a foolish man who put them into service till they had been tested. To use them as an excuse for the bringing in a whole-time service shook Lord Dawson's confidence.

In a comprehensive scheme all medical services sponsored must come under one umbrella and must be governed by the same broad principles of policy under the Ministry of Health. There must be no contracting out. Lord Dawson confessed dismay on hearing that the Ministry of Health had given way to the hustle of political urgency. The medical profession would not take employment with a local authority naked and unadorned, at least not now, though in time he thought it probable that salary as against fees would play a larger part in professional earnings.

The relation of doctor and patient brought out all the attributes which belonged to the practice of medicine at its best. Lord Dawson urged the Government to think long before doing anything which would prevent the fostering of these ideals.

ENDORSED IN A MAIDEN SPEECH

Lord MORAN said that the first essential of any scheme was sound central machinery. Allactivities concerned with health should come under one department, and not six as at present. Also the machinery should enjoy the confidence of the medical profession. It was essential that in the Ministry of Health civil servants who were not doctors, and doctors who had long been divorced from the work of medicine, should keep in close touch with those actively engaged in practice. He had in mind a medical council which should help to frame the policy of the minister, meeting regularly and free to publish uncensored reports. Such a council might be composed, say of twenty medical members, fifteen perhaps elected by the profession and five appointed by the minister, including the ministry's chief medical officer, and electing its own chairman. He hoped that the minister would give this council real power. The opposition to a comprehensive medical service was based on the objection of the medical profession to become employees of local authorities. If that was to be overcome there must be some machinery for referring disputes between the authority and its doctors to some central court of appeal, and the council might act in that capacity, while a subcommittee could act as an appointments bureau and administer a superannuation scheme for every doctor in the service. The second essential was that the conditions under which the rank and file of the profession worked should be made as perfect as possible. If doctors instead of practising at their own houses were banded eight or nine together and saw patients at some house built for the purpose with facilities for diagnosis and with consultant services at their elbow they would breathe again the atmosphere of their student days in the hospital wards. He thought most doctors at present were opposed to health centres, and that the public were suspicious of them, fearing that free choice of doctor would disappear. But surely that could be overcome with efficient secretarial organisation, and he hoped that the doctors' opposition would also disappear after a time. They need not fear that this was coming overnight; the centres had still to be built, and there would be plenty of time to try them out.

The question of the local authority was really the thorn sticking in the flesh of the profession now. The doctor felt that he would become the playboy of local politics. To avoid this, perhaps the country could be divided into ten or twelve regional administrative units, each working with a university, and from which all local feeling and influence would be excluded. But it would be useless to dragoon doctors to work under local authorities unless some reassurance could be given that the scheme would not interfere with their work. The third essential was a good consultant service, open to everyone whatever his means. There were not enough consultants at present, and those available were not distributed according to the needs of the community. No list existed at the present time, but the three royal colleges had agreed to draw up one for the Ministry of Health. It was impossible to ensure at first that only those went on to that list who had had the necessary special training. To begin with this list must be drawn up on one criterion only: the approval of the profession in the doctor's neighbourhood. In the twelve university cities in England, Wales, and Northern Ireland committees were now sitting to draw up lists under the chairmanship of the vice-chancellors of the universities. Once the list was completed any man who aspired to have his name added would have to satisfy a board that he had done the years of special training required, and that he was competent to act as a consultant. This was in accord with American procedure. A royal commission was not needed to say that change in the medical services was necessary. But Lord Moran thought that a royal commission could determine how this change could be made without disturbing the relationship between doctor and patient.

The Earl of HUNTINGDON suggested that the trouble with the National Health Insurance was that it was never national. It provided a limited insured population with insufficient means to maintain them in sickness, furnished a medical service which stopped short of the absolutely necessary specialised treatment, and cut down the benefit when it was most needed.

THE GOVERNMENT'S RESOLVE

Lord SNELL said that the Government had made no final decision that the medical profession should be turned into a state-salaried service. There was no justification for the view that the Government were rushing heedlessly down steep and slippery places. The medical profession was being consulted at every stage. In "the kindest possible way," he congratulated Lord Dawson on a really "good trade union speech such as I have been accustomed to hear and enjoy all the years of my life." While a free choice of doctor was desirable Lord Snell admitted he was not among those ultra-loyal souls who would prefer to die under the care of a doctor whom they knew rather than be cured by a perfect stranger. In conclusion he added that the Government had resolved that while there shall be no irresponsible haste there shall also be no unreasonable delay.

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QUESTION TIME

Relief Scheme for Tuberculous Patients

Mr. H. McNEIL asked the Secretary of State for Scotland why, in his recently announced scheme of relief for tuberculosis patients and their dependants, he had excluded from the scheme all patients suffering from tuberculosis other than pulmonary disease.—Mr. J. WESTWOOD replied: The purpose of the allowances scheme is to encourage people who are suffering from pulmonary tuberculosis to seek early treatment, not only in their own interest but—since the disease is infectious—in the interests also of their families and of the general community. The scheme does not extend to persons suffering from non-pulmonary tuberculosis because the disease in this form is not infectious and does not constitute such a danger to the general public health.—Mr. McNEIL: Am I to understand that the danger of infection to other people, and not the necessity to treat the sufferer, is the main reason for this scheme of dependants' allowances?—Mr. WESTWOOD: The main reason for the scheme is the report of a committee set up by the Medical Research Council at the instigation of the Government, which recommended these allowances for pulmonary tuberculosis cases and made no recommendation so far as non-pulmonary cases are concerned.

Accommodation for Maternity Cases

Mr. R. W. SORENSEN asked the Minister of Health whether, in his consideration of future adequate national health and medical services, special attention was being given to the need of providing efficient municipal maternity homes throughout the country; and if he would state the present number of private and municipal maternity homes and their respective number of beds.—Mr. E. BROWN replied: In the schemes for the future the provision of adequate accommodation for maternity cases is being considered in common with all other classes of case needing institutional care. According to the latest figures in my department there are some 4100 maternity beds in voluntary institutions, 8000 in municipal homes and hospitals, and over 3000 in the emergency maternity homes established by my department, making a total of between 15,000 and 16,000 beds in all.

Deputy Directors of Medical Supplies

There are two deputy directors of medical supplies, Mr. H. Wilkinson and Mr. A. Mortimer. They are responsible, under the director, for planning the production of all medical supplies. Mr. Wilkinson is a permanent civil servant. Mr. Mortimer's services were lent to the Ministry of Supply, without charge to public funds, by the Wholesale Drug Trade Association, of which he was and is the paid secretary. On joining the Ministry he ceased active participation in the day to-day administration of the association. (Sir ANDREW DUNCAN replying to Mr. ROBERT MORGAN.)

Venereal Disease in the Seychelles

Mr. DAVID ADAMS asked the Secretary of State for the Colonies why it had been made a criminal offence for any unmarried woman, under 30 years of age to live in the town of Seychelles, unless she was living with her parents or employer, or was a properly appointed school-teacher or probationer nurse.—Colonel O. STANLEY replied: A defence order was made to prevent the renting of rooms in houses in the central or suburban districts of Mahé for immoral purposes in view of the serious danger of spreading disease among the personnel of visiting ships and troops stationed on the island. In addition to the exceptions referred to, the order does not apply to any young woman who satisfies the superintendent of police that she is in bona fide employment either on her own behalf or for monthly wages, or has any other good reason to stay in any house or room in the prescribed area. Mr. ADAMS: Would it not be better to take steps to eliminate venereal disease which is so current in Seychelles?—Colonel STANLEY: That would be desirable anyhow, but the position in Seychelles was really grave and drastic steps had to be taken. I admit that this step is a drastic one, but I believe that under the circumstances it was fully justified.

The Index and title-page to THE LANCET, Vol. II, 1942, which was completed with the issue of Dec. 26, will be ready shortly. A copy will be sent gratis to subscribers on receipt of a post card addressed to the Manager, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

Letters to the Editor

DOCTORS AND THE FUTURE

SIR,—Your balanced leading article of May 22 should do much to clarify the views of the profession on our impending reorganisation, the necessity for which is obvious to all who approach the problem impartially and to which it is apparent the Government is committed. It is not a question of resisting the change, but of seeing that the alterations introduced will be of mutual benefit to the doctors and to their patients. Lord Dawson's phrase "collectivism for its fabric and individualism for human relationship" ably summarises the end to be achieved.

The medical fraternity is divided into two main classes: the specialists who have narrowed their interests and are more concerned with a particular class of disease or surgical technique or the problems of human ecology, and those who have remained general practitioners of medicine and who treat the whole patient taking into consideration his individual environment. In my opinion these two categories require organising in different ways.

A great deal of the opposition to medical planning is commercial and unworthy of the ideals which inspire our profession in its work. The specialists can and would work more efficiently, although perhaps for some, less profitably, if they were employed in a full-time salaried service in which promotion depended not only on length of service but on individual merit and in which the principle of personal responsibility for a case and freedom from unnecessary interference from seniors were safeguarded. That this latter precaution is necessary is shown by the contents of the letter which you printed on p. 663. In such a service a keen man would be free to give all his skill to his main interest without loss of efficiency due to his concern for his economic position.

The case of the general practitioner is very different. He takes an interest in his patient both as an individual well known to him and as a person who is sick and needing his help. For the maximum benefit to arise from this relationship it is essential that it should be one of free choice on the part of both participants. This can only be assured, not by changing the present system of private practice but by extending it so that the "panel" includes all workers and their dependants, including the higher salaried groups, so that all may be able to afford the prescribed treatment. It is significant that in a place where the majority are free from the fear of want—Bournemouth for example—there is no complaint about the present system of private practice. Rather than sweep it away, extend the facilities which the practitioner needs to help his patient, such as readier access to clinical laboratories and to X-ray plants. Also the freedom of choice by the patient should in the long run ensure that the better doctor flourishes at the expense of the indifferent, at least in an educated democracy, and would thus be as conducive to efficiency as promotion would be in the case of the specialist.

Our aim should be the maximum professional efficiency compatible with the maximum degree of personal freedom for doctor and patient. We must never let planning and regimentation destroy that most priceless possession of man and on which progress depends, the initiative of the individual.

Liverpool. A. C. T. VAUGHAN.

THE BURN AS AN OPEN WOUND

SIR,—Although with great reluctance to differ from him I must protest against the implications of the last part of Colonel Colebrook's letter in your issue of May 29 (p. 693). His words are these: "A patient received a severe burn of the forearm and hand at 8 PM. It was thoroughly treated with acriflavine and effectively covered with dressings at about 9 PM. Three hours later, on arrival at the hospital, hæmolytic streptococci were cultivated from the burned area." Surely this is too exceptional a case to cite in support of a disbelief in the dependability of acriflavine as an antiseptic for primary treatment. So precocious an appearance of this infection in spite of the burn being "effectively covered" almost suggests spontaneous generation.

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If the burn was contaminated with hæmolytic streptococci from the very outset, all that we know of the properties of flavines favours the belief that "thorough treatment" would either destroy these organisms or at least so reduce their activity that they could certainly not multiply enough to be recoverable in culture after so short a period as four hours.

I do not wish to be understood as advocating the treatment of burns with acriflavine. A burn is not the same thing as a wound, nor is acriflavine the same as proflavine, which is decidedly to be preferred to it. But I have for many years advocated the use of flavines for prophylactic application to wounds: fresh evidence of their efficacy has been forthcoming recently, and until much larger supplies of penicillin become available, proflavine will remain one of the most promising wound antiseptics we have, at least for certain purposes. An experimental study is about to be made in the Army of the effect in wounds of a powder containing 1% of proflavine in sulphathiazole. Colonel Colebrook may not have intended his scepticism to refer to any such use, but the episode he relates is so startling that conclusions of more general application will certainly be drawn from it. I therefore venture to submit that this case must have been highly exceptional in some particular to which his brief account of it gives no clue.

Hill End Hospital (EMS), St. Albans. LAWRENCE P. GARROD.

REHABILITATION OF THE TUBERCULOUS

SIR,—Dr. Poniedel suggests (*Lancet*, May 29) that rehabilitation must be provided for all symptomless patients found to have shadows in a routine X-ray examination. Is not this carrying things a little far? Even if the patients with early minimal lesions, without signs or symptoms, were willing to accept rehabilitation (and this is most unlikely), it would be necessary to provide accommodation for at least 150,000. And for what purpose? Symptomless shadows have not been followed up long enough yet to see what proportion, if any, eventually develop signs or symptoms of active tuberculosis. But these shadows do show a marked resemblance to the shadows that are the ultimate result of successful treatment.

Experience of treating early lesions has convinced me that many patients with a strictly limited radiological shadow, even though at one time they may have had symptoms, will be perfectly fit to return to their work provided they are prepared to limit their non-working activity and lead a reasonable, restricted home life. I believe that play is the factor that leads to relapse more often than work.

Rehabilitation is an essential weapon in the treatment of tuberculosis, but it must be reserved for those cases in which disease definitely limits the working capacity of the patient, or in which infective sputum renders segregation imperative. Education and adjustment, together with careful dispensary supervision, appear to be all that is necessary for the aftercare of the symptomless shadow.

Papworth Village Settlement. F. L. WOLLASTON.

A VITAMIN-FEEDING TEST IN SCHOOL-CHILDREN

SIR,—Since February, 1942, about 1000 Cambridge elementary-school children between the ages of 4 and 11 years have been under observation in a controlled vitamin-feeding test. Pellets were distributed daily at school. The children given the vitamin pellets received each school day 5000 IU vitamin A, 1 mg. vitamin B_1, 25 mg. vitamin C and 500 IU vitamin D, so that, allowing for holidays and possible absences from school, the pellets supplied roughly half the daily requirements of these substances. Some of the results of a re-examination of the children after one year's dosing have just been completed. Compared with the controls, no differences have been detected in the following:

Increase of height and weight, hæmoglobin, strength of grip (determined in all the children).

Intelligence, measured by Raven's Progressive Matrices (determined in 700 older children).

Educational attainment, measured by Burt's Northumberland Test II (determined in 550 older children).

Dark-adaptation, pulse-rate, vital capacity, breath holding, 40 mm. mercury test (determined in 200 older children).

One positive result, however, has so far been observed. Accurate records of absences kept by the teachers at one of the schools, for about 430 of the children, show a significant reduction in the incidence and duration of colds in the "vitamin" children. These were away because of colds on an average 1·37 times (4·87 days) during the year; the control children were away 1·67 times (6·86 days). There was thus a reduction of 18% in the number of times away and 29% in the number of days away. Of the 217 children receiving the vitamin pellets, 76 had no colds; of the 216 control children, 55 had no colds. All of these differences are statistically significant. Absences due to other causes were unaffected.

The fact that the vitamin supplement produced no effect on nutritional status other than the reduction in the incidence and duration of colds does not imply that the nutrition of these children was completely satisfactory. Appreciable differences in nutritional status were observed in different groups of children. Thus, the average heights, weights, hæmoglobin, strength of grip and also educational attainment were all lower in children from a poorer part of the town than in those from a better part. In addition, in both areas, these characteristics were lower in children from larger than from smaller families. The absence of improvement by vitamin feeding even in these characteristics indicates either that the poorer nutritional status of these children was caused by dietary constituents other than vitamins A, B_1, C and D or that these substances were not the principal limiting factors in their diets.

The various examinations of the children were carried out in collaboration with Mrs. M. Russell Davis, Mr. E. B. Grandison, Dr. G. Neil Jenkins and Dr. Janet Laidlaw. Detailed reports of the results will be published elsewhere. The pellets were supplied free of charge by British Drug Houses, Ltd.

Dunn Nutritional Laboratory, Cambridge. JOHN YUDKIN.

SEMEN IN STERILITY

SIR,—In your leader of May 8 you state that for the taking of semen specimens an ordinary rubber condom is satisfactory, provided it is thoroughly washed in water and then dried in clean filter paper. This conflicts with my experience and with that of Tynen and Ranson (*Lancet*, 1942, ii, 425), since a toxic substance is usually present in the rubber which can be extracted by alcohol containing ammonia. Specimens taken from sheaths which have been thoroughly extracted show motility equal on the average to that obtained by other methods. The sheath should be emptied into a glass specimen tube with waxed cork as soon as possible, and may be kept at room temperature until examined. I find it convenient to issue the cleaned sheath and test-tube with the necessary instructions.

General Hospital, Northampton. E. S. DUTHIE.

RENAL UNITS

SIR,—In stressing the need (*Lancet*, May 1) for the creation of special renal units for the more efficient investigation, nursing, treatment and aftercare of patients suffering from Bright's disease and other medical diseases of the kidneys I seem to have given General Page (May 8) and Dr. Ellman (May 15) the impression that I advocate the setting up of hospitals devoted solely to this purpose. I did not in fact allude to their location, but my own view is that small units suitable for undergraduate instruction and intensive research in highly technical problems might well be accommodated in large general hospitals. Much larger units, however, would be needed to deal with the problem on a national scale, and for the prosecution of statistical research. Probably these could best be formed in large hospitals specialising in several closely related subjects—such, for example, as hearts, kidneys and (say) obstetrics. Full laboratory and other auxiliary services would be essential, including an affiliated staff of experts in other branches of medicine. Acute as well as chronic cases should be admitted to secure continuity of treatment, the importance of which is sometimes overlooked. In exceptionally favourable circumstances, as in a university town, an exclusively renal hospital in close proximity to, and in intimate

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association with, other special and general hospitals, might well achieve an even higher standard of efficiency. In my opinion, however, wherever such units are established they must be staffed by whole-time specialist doctors and nurses, if the best results are to be obtained.

Both your correspondents express concern at the increasing trend towards over-specialisation. The main purport of my letter was, however, to lay emphasis on the fact that the branch of medicine which comprises the medical diseases of the kidneys is suffering from under-specialisation. This too has its dangers—especially for the patient.

Pembury, Kent. A. A. OSMAN.

PLANTAR WARTS

SIR,—In your annotation of May 22 on plantar warts the only method of treatment mentioned is X rays. At my hospital we were taught (by Mr. V. H. Ellis) to scoop them out with a blunt spoon. The wart is softer than the surrounding skin and a neat hole is left behind. When there are several little extra time is required to deal with them if a 5 or 10 c.cm. syringe is used for injecting the local anæsthetic, and the patient can walk immediately, with little or no pain.

Winfrith, Dorset. P. R. BOUCHER.

SIR,—I cannot agree with some of the remarks in your annotation. Surely plantar warts are the same as other warts, only they are situated in denser tissue and are pressed in by walking instead of growing outwards like warts in other places. X rays should, in my opinion, never be used for plantar warts; they so often fail and I have seen some terribly burnt feet from their use. Excellent results may be obtained by curetting and cauterising plantar warts, with no risk of permanent injury to the feet.

Brook Street, W.1. JOHN FRANKLIN.

THE MEDICAL PROFESSION IN HOLLAND

SIR,—As a Dutch doctor who has managed to escape from Holland, I should like to give my British colleagues some particulars of the way in which the Nazis are treating the medical profession in my country.

When the Germans invaded Holland, we Dutch physicians, whatever we felt as individuals, were naturally prepared to carry on with our professional duties. It may be recalled that Seyss-Inquart, the German Reichskommissar appointed to rule over our occupied country, had declared immediately on his entry into The Hague that Germany meant to respect our customs and traditions and our mode of life. But barely four months had passed before the Nazis (in September, 1941) instituted their various "culture chambers" for the different professions, and among them the *Artsenkamer*, membership of which became compulsory.

Of 6000 medical men only about 15% registered their names with the *Artsenkamer*, and even these did so only because they were medical officers of workers' or other associations who felt that, on balance, their professional duty to the members of these associations outweighed all personal considerations and objections. A total of 4309 physicians, almost the whole of those in private practice, accepted the loss of their status as registered practitioners—since non-registration turned them officially into "quacks"—in preference to membership of the *Artsenkamer* with its Nazified conceptions of a doctor's duties (subservience to state interests, compulsory "euthanasia," &c.).

In December, 1941, a joint letter of protest, signed by 4000 medical men, was addressed to Seyss-Inquart. It pointed out these fundamental differences between Nazi conceptions of medical duty and those of the Dutch doctors, and contained a pointed reference to the Reichskommissar's original undertaking not to interfere in Holland's customs and ideology. The upshot was that the doctors were allowed to continue to exercise their profession, though they remained deprived of legal status.

Next came a regulation sharpening the prohibition of the word *Arts* (physician). Only members of the *Artsenkamer* were allowed to keep this description on their name-plates. Again the physicians acted without hesitation. They covered the word *Arts* on their door-plates with strips of court-plaster and, secure in their patients' confidence and loyalty, carried on. I need hardly point out that the degree of mutual confidence involved is considerable. Officially, the practitioners no longer have any professional standing; and legally it is doubtful what their position would be if anyone refused to pay for their services.

The latest development is the most serious of all. The Germans have now announced their intention of drafting a number of Dutch doctors to Germany, there to put them in charge of the treatment of inmates of labour camps. This is to be accomplished by applying to the physicians the regulations regarding the total mobilisation in Holland of man-power and labour. Some 5000 Dutch doctors have signed an open letter of indignant protest addressed to Reichskommissar Seyss-Inquart. But behind all this lies the shadow of the death penalty, which can now be inflicted on doctors if they obstruct German "total mobilisation" measures.

A. M. MEERLOO.

*** Letters passing between the Nazi-appointed authorities and the doctors are quoted by the Netherland Government Information Bureau in London. On March 30, in a circular to all practitioners, the authorities pointed out that though the doctors had given up the title of *Arts* they nevertheless continued to practise. Therefore their resignations from the *Artsenkamer* must be considered a deception, and were accordingly null and void. After May 1 they must use the title of *Arts* and display it on their name-plates. To this demand some 95% of the profession replied: "I do not consider myself a member of the chamber. If the occupying force is of opinion that I am not allowed to do medical work because I maintain this attitude, then I am prepared to accept the consequences."—ED. L.

FORMATION OF RED BLOOD CORPUSCLES

SIR,—In answer to Dr. G. R. Tudhope (May 29) I would say that textbooks of pathology recognised that vascular tumours such as angiomas contain two kinds of blood—blood which is circulating for the purpose of nourishing their cells, and blood which, strangely enough, is independent of the general circulation.

In a further paper I have now written I describe a complete study of an angioma of the calf of the leg. The differential cell-count of blood tumour is completely different from the differential count of the peripheral blood of the same patient. Photomicrographs demonstrate the various kinds of cells in the tumour, and sections reveal that the nutritive blood is very different from the blood in the angioma dilatations.

Ancoats Hospital, Manchester. F. DURAN-JORDA.

DEFICIENCY ANÆMIAS OF MALNUTRITION

SIR,—I have just received copies of my article in the *Lancet* of Jan. 9, 1943 (p. 43); perhaps I may add one or two afterthoughts. I am sorry if it conveys the impression that little attention has been paid in Great Britain to nutritional anæmias: the truth is that much attention has been paid to iron-deficiency anæmia and a little to vitamin-C deficiency anæmias, but almost none to the macrocytic anæmia which appears to go with a poor diet—apart from the macrocytic anæmia of pregnancy and the puerperium. The papers published on the latter anæmia in temperate regions, on tropical macrocytic anæmia in pregnant women of the tropics, and on nutritional macrocytic anæmia in men and children show no point of distinction, and this suggests that the anæmia is either identical or very closely allied. Dosage of liver extracts is the only serious point of disagreement. Observations, though limited in number, on the mean diameter of red cells in nutritional anæmia show that it is sometimes macrocytic, sometimes normocytic, but that the cellular thickness appears to be increased. An unsuspected associated iron deficiency may however have been present in some of these cases. We should preserve an open mind with regard to how this anæmia is produced—it appears to be connected with dietetic deficiency of protein, but almost nothing is known about "extrinsic factor" and at present we have no adequate explanation or definition of this nutritional anæmia. The term dimorphic anæmia should only be used for an anæmia which is due to the dual deficiencies of iron and of nutritional macrocytic

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anæmia and yet has no obvious cause such as sprue or steatorrhœa. It is quite possible that other factors are present; in the tropics malaria and helminths play an important part. Possibly the vitamin-B complex plays a part, since in a few of our cases the deficiency bowel pattern of Ross Golden has recently been detected. At the discussion at the Royal Society of Medicine in October, 1942, there was a feeling that anæmia was increasing in Britain, that perhaps it was not entirely due to iron, but might be due to deficiencies of protein; but no-one mentioned slight degrees of nutritional macrocytic anæmia complicating iron deficiency.

Kampala, Uganda. H. C. TROWELL.

SAFE MILK AND THE YOUNG CHILD

SIR,—With much of your annotation in last week's issue under this title I cordially agree, but your example is unfortunate. The doctor in the northern city who requires TT milk for his 8 months baby should know that the only safe milk for such a child is boiled milk. No children's physician of experience in this country would advise any other form of liquid milk and if milk has to be boiled then it does not greatly matter whether it has been pasteurised or if it is TT milk. The example you give therefore is only too obviously part of that faintly muddled thinking about milk which still characterises some of the profession. You can scarcely blame the Ministry of Food for not being health-minded about milk if members of the medical profession themselves are uncertain about a milk policy for children. The danger of infection for the doctor's child you quote can be obviated by boiling. It is a pity you suggest in your annotation, by implication, that there is any other course available.

Aylesbury. ALAN MONCRIEFF.

*** We agree that the young child, whose diet is mostly milk, must be fully protected from milk-borne infection. Complete safety can be ensured only by heating the milk in the home. The ideal, for the few who have facilities, is to buy milk produced under the best conditions (TT milk) and pasteurise it shortly before use. Mothers who cannot do this must boil all milk before giving it to young children.—ED. L.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED MAY 29

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1997; whooping-cough, 2233; diphtheria, 712; paratyphoid, 10; typhoid, 5; measles (excluding rubella), 7395; pneumonia (primary or influenzal), 760; puerperal pyrexia, 158; cerebrospinal fever, 80; poliomyelitis, 3; polio-encephalitis, 1; encephalitis lethargica, 1; dysentery, 116; ophthalmia neonatorum, 88. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on May 26 was 1871. During the previous week the following cases were admitted: scarlet fever, 131; diphtheria, 41; measles, 104; whooping-cough, 41.

Deaths.—In 126 great towns there were 1 (0) deaths from enteric fever, 3 (0) from scarlet fever, 6 (0) from measles, 9 (2) from whooping-cough, 24 (1) from diphtheria, 33 (8) from diarrhœa and enteritis under two years, and 13 (2) from influenza. The figures in parentheses are those for London itself.

The cases of diphtheria were scattered over 21 great towns, Stoke-on-Trent and Merthyr Tydfil each reporting 2.

The number of stillbirths notified during the week was 201 (corresponding to a rate of 29 per thousand total births), including 22 in London.

ROYAL SOCIETY OF MEDICINE.—At a meeting of the section of obstetrics and gynæcology to be held on Friday, June 18, at 3.30 PM, Dr. N. A. Ashton will describe a case of pregnancy complicated by convulsions due to cysticercosis cellulosæ. Afterwards Mr. Victor Bonney and Mr. V. Zachary Cope will open a discussion on the diagnosis and treatment of the acute abdomen from the gynæcological point of view. The section of psychiatry will meet, at 2.30 PM, on June 19 at Friern Hospital, New Southgate, N.11, when cases illustrating the evolution of paranoid states will be discussed. The opening speakers will include Dr. John Brander and Dr. W. H. Gillespie.

NUTRITION MOVEMENT IN THE UNITED STATES

F. LE GROS CLARK, B A

THE proposal for the establishment of a Nutrition Council makes it opportune to review similar recent developments in the USA.

ORIGINS

The pioneer work of the 'twenties had met with a set-back at the time of the financial depression. By 1930 several of the states had nutritionist consultants; but the withdrawal of federal grants-in-aid resulted in retrenchments: by 1932 only five state and city boards of health were recorded as employing nutritionists, and by 1936 not more than three states (Massachusetts, Connecticut and New York) included such an office within their health agencies. In 1936, however, social security funds became available, and in reponse to federal pressure some thirty-six states were, by the early months of 1941, budgeting for the services of one or more nutritionists. These nutritionists were usually attached to the state division of maternal and child welfare; and through these and other means a number of the states had already gone far in linking up the nutrition work, both official and voluntary.

In 1936, again, the President created an interdepartmental committee to coördinate health and welfare activities, and in the summer of 1940 a nutrition policy planning committee was formed under the chairmanship of Dr. M. L. Wilson. It was this interdepartmental committee, augmented by representatives from outside, that arranged a national nutrition conference in May, 1941. The committee had advice on technical dietetic problems from the National Research Council, which had already established subcommittees to deal with nutrition and with food habits.

Present national activities spring mainly from the Washington Nutrition Conference of May, 1941. On Sept. 3 following was formed the nutrition division of the office of Defence Health and Welfare Services with the object of providing machinery to unite the multifarious work. Twenty federal agencies associated with the general nutrition programme had already been organised for war purposes under the chairmanship of Governor Paul V. McNutt, and the new Nutrition Division could therefore concentrate upon the requirements of the forty-eight states composing the USA.

During 1941–42 some twenty states held conferences at the call of their governors, and nutrition committees of a kind now exist in all the states, working with and through the councils of defence. Their precise activities are of interest to us. Briefly, they are directed to survey the existing state agencies concerned with nutrition and to distinguish gaps in the services, to pool information arising from local surveys, to develop educational methods, and to examine ways in which changes in the food situation may best be met. A few of the states have developed a local bulletin service to all communities within their area where a corresponding committee has been established; a similar bulletin service has been organised at monthly intervals between Washington and the state committees.

COUNTY COMMITTEES

But it is in the county committees that the true and intimate vigour of the nutrition movement in the USA most often finds expression. By the close of 1942 some 2600 out of the 3000 counties had already formed active nutrition committees. They include representatives of all manner of professional and civic bodies, interested private individuals, and (in due proportion) nominees of administrative departments. Their business is to deal with courses of instruction to the public, with the school meal schemes, with the projection of surveys, and with the development of "neighbourhood leadership" among housewives. Lecture courses, it seems, have concentrated specially upon the increase of home production in small towns and among rural families, and upon improvements in cooking and in the selection of food purchased. In some counties the committees took part in the campaign to popularise fortified flour and bread (before

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its use was compulsory), and the equipment and use of industrial canteens.

County committees have often formed subcommittees to deal with industrial nutrition, membership being enlarged to include representatives from state health departments, industrial organisations, and food producers and caterers.

STRUCTURE OF THE CENTRAL AGENCY

Director of the Nutrition Division, attached as it is to the office of Defence Health and Welfare Services, is the same Dr. Wilson who had earlier been chairman of the planning committee. An interdepartmental coördinating committee links some twenty federal agencies, tendering advice on policy and dispersing responsibilities among them. From this body it seems has been formed a Nutrition Executive Committee, charged with directing and systematising popular education.

On the public side of its activities the Nutrition Division has at call a number of advisory committees, to assist in solving technical and social problems. The National Research Council maintains its natural relationship with the division, and three other bodies to be consulted on occasion are :

(*a*) The Nutrition Advisory Committee, composed of the representatives of such organisations as the Home Economics Association, the Dietetics Association and the Institute of Food Technologists ; (*b*) the Labour Advisory Committee ; (*c*) the Food Industry Advisory Committee, whose function it is to interest food manufacturers and distributors in the educational programme and to consider the special problems of industry.

Beyond this wholesome work of coördination and standardisation the Nutrition Division is conceived as possessing certain responsibilities.

(1) Its director and his staff must make a theoretical study of the provision of adequate nutrition services to the community and must draw up practical plans for their operation.

(2) They must undertake the coördination of all surveys and inquiries made by federal departments and agencies in regard to such nutrition services in general.

(3) They must examine steps for the integration of state and voluntary agencies to meet the needs of every type of community.

(4) They must arrange for the training and provision of nutrition specialists to assist in the planning and execution of state and county programmes.

AMERICA AND OURSELVES

This survey does not pretend to examine the part played by the various federal departments in their association with the Nutrition Division. Most of them possess their own specialists, who have designed and issued appropriate literature and organised courses of instruction for such officers as will be required by the state departments of Education or of Maternal and Child Welfare. On the bearing of American experience upon our own problems a few tentative conclusions may perhaps be drawn. We have now a committee established by the Nutrition Society, with the support of the Ministers of Health and Food, for the coördination and presumably for the rational expansion of nutrition research. That is a significant stage on the path towards a Nutrition Council. But we have as yet no popular fabric of local committees, such as those that are apparently emerging in the USA ; we have no organised ferment at work within the body social. If there be any ferment of this nature, it is represented by the dispersed local branches of a few independent organisations that have been diligent in educating the public on matters of diet and in the nutritional services.

It may be timely to consider whether an effort could not be made to stimulate the growth and cohesion of these scattered cells into an organic movement among our cities and villages. Any project of this kind would attract the support of research workers, social workers, educationists and members of the medical profession ; many of them are already engaged privately in arranging lecture courses and demonstrations, and in making investigations of small dimensions but valuable results. We possess the material, if we care to use it.

Obituary

ARTHUR MACKLER

MRCS ; CAPTAIN RAMC

Captain Arthur Mackler died during March from wounds received in the battle for the Mareth line. He went forward over enemy-mined ground to help a sergeant seriously wounded by a booby trap on a disabled tank. He attended to the sergeant and got him on a stretcher but while the party were picking their way back through the enemy mines one of the stretcher-bearers caught his foot on a trip-wire which set off two German mines. The wounded sergeant and a stretcher-bearer were killed and five others hurt. Mackler, though himself wounded, continued to give directions for the dressing of his comrades and himself. He died at a casualty-clearing station two days later.

Arthur Mackler was born in London in 1915, the son of Mr. J. Mackler, and was educated at the Central Foundation Boys School in the City of London and at King's College Hospital where his friends recall his quick incisive intelligence and simple lovable character. He qualified in 1939 and on the outbreak of war immediately volunteered for service. He served in the Middle East for three years and saw service in Norway, Greece and Crete, and his long experience in the desert made him a valued adviser. The little Doc, as he was called, will be remembered for his readiness to help and invariable cheerfulness.

WILLIAM BOXWELL

MD DUBL, FRCPI

Dr. William Boxwell, senior physician to the Meath Hospital and professor of pathology in the school of the Royal College of Surgeons in Ireland, also a past president of the Royal College of Physicians of Ireland, died early on the morning of 22 May at the age of 67. He had spent some hours in his laboratory the night before, and having finished his work returned home, and was on his way to bed when he collapsed and died.

Boxwell was a grandson of the great William Stokes whose lectures on the heart made Dublin teaching famous a hundred years ago. Boxwell entered Trinity College some fifty years later and graduated in arts before beginning to study medicine. During his student years, as became an old Shrewsbury boy, he captained the University team in Association football. He was from early in his medical course a student of the Meath Hospital, where many of his relatives had been members of the staff. Boxwell qualified in 1903 and in 1908 he was elected a fellow of the Royal College of Physicians of Ireland. After holding junior offices at the Meath Hospital he became a member of the senior visiting staff, and in 1918 was appointed to his chair. These two offices were a heavy load for one man to carry, but for both Boxwell was obviously well fitted. His approach to medicine was as much pathological as clinical. He established a close correlation between clinical findings and underlying pathological anatomy, checking, as far as opportunity went, clinical conclusions by post-mortem findings.

For many years past Boxwell occupied a peculiar position in the medical profession of Dublin. He was regarded by some as one of the conservatives, by others as a modern. In truth he was both : none had a better grasp of the fundamentals of clinical medicine and human pathology, while few had a firmer grasp of the important advances of our times.

But whatever label might be attached to him, all who knew him appreciated the soundness of his scientific knowledge and of his clinical judgment. Boxwell inherited an outlook which was not only scientific but cultured, and he was a lover of good music and a reader of good literature. A generation ago a Dublin physician, speaking of a colleague just dead, remarked, " No one

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ever heard a word spoken against him. One reason was that only a fool would speak so, for no one would believe him." And one might truly say the same of Boxwell. Irish medicine is the poorer by his passing.

GERARD FREDERICK BARNES

M R C S ; LIEUTENANT RAMC

THE death of Lieut. G. F. Barnes on active service in Tunisia at the age of 24 recalls his adventure in the Medjez-el-Bab area when he drove an ambulance flying the red-cross pennant into the enemy lines to evacuate some wounded men. When he was about twenty yards from their lines the Germans beckoned to him to come on and after exchanging salutes with their officer Lieut. Barnes indicated that he wished to take back the crew of a Bren-gun carrier which he had seen being knocked out. The German officer ordered his men to place the Englishmen on stretchers and carry them to the ambulance.

Keturah Collings, London

The elder son of Lieut.-Colonel Bernard Barnes, he was educated at Ealing Priory School, King's College, London, and Charing Cross Hospital. A friend writes: "His charm, personality and friendly easy manner could never be forgotten. He took an active part in the OTC at King's College and was one of the leaders of the Charing Cross Home Guard unit, and a keen member of the CXH rugger team and of King's College rowing crew." He qualified in May last year and was acting as senior casualty officer while preparing for his final MB when he was called up in November. After a short training with a field ambulance in this country he was posted to North Africa early this year and was killed in action while serving as a regimental officer.

Barnes married Miss Margaret Dalzell of Victoria, British Columbia, and their son was born this year.

Appointments

GRAY, THOMAS, MB RUI: part-time medical superintendent at Astley Hospital, Lancs.

MCKEAN, C. W. F., MB CAMB.: assistant MO in the VD department of St. Mary's Hospital, Paddington.

ISBISTER, W. J., MB GLASG.: examining factory surgeon for Leith.

RAFTERY, LILIAN, MRCOG: first asst. in the gynæcological and obstetric department of the London Hospital.

RIGGALL, R. M., LRCP: deputy medical superintendent at Cefn Coed Hospital, Swansea.

Births, Marriages and Deaths

BIRTHS

BEALES.—On June 1, in London, the wife of Flying-officer Philip Beales, MB, RAFVR—a son.

DAVIES.—On June 2, the wife of Dr. Herbert Davies, of Gravesend, Kent—a son.

MARTIN.—On May 30, at Cambridge, the wife of Dr. Laurence Martin—a daughter.

MUNRO-ASHMAN.—On May 30, the wife of Dr. Donald Munro-Ashman, of Uxbridge—a son

PROSSER.—On June 2, at Harrogate, the wife of Major L. J. Prosser, RAMC—a son.

SHEARER.—On May 27, at Newtown, Montgomeryshire, the wife of Captain J. A. W. Shearer, RAMC—a son.

VAUGHAN.—On May 22, at Liverpool, the wife of Flight-Lieutenant A. C. T. Vaughan—a son.

MARRIAGES

ALCOCK—BREALEY.—On May 25, in London, Reginald John Alcock, surgeon-lieutenant, RNVR, to Jean Venetia Brealey.

PARK—BUNGE.—On May 31, in London, Jack Park, MB, squadron-leader, RAF, to Charlotte Cicely Bunge, assistant section-officer.

PENISTAN—READE.—On June 5, John Llywellyn Penistan, MRCP, to Violet Mary Reade, ATS, only daughter of Surgeon Captain A. G. L. Reade and Dr. Violet Reade.

DEATHS

KINGCOMBE READ.—On June 1, at Bath, Harold William Kingcombe Read, LRCPE, lieut.-colonel RAMC retd., late of Nice.

MCKENDRICK.—On May 30, at Carr Moor, Carr Bridge, Inverness-shire, Anderson Gray McKendrick, MB GLASG, D SC ABERD., FRCPE, FRSE, lieut.-colonel IMS retd.

MATHEW.—On May 29, at Exeter, Charles Pynsent Mathew, MRCS.

SIMPSON.—On June 5, at Crescent, Shrewsbury, Archibald Simpson, MB EDIN., FRCSE.

Notes and News

MEDICAL SERVICES IN MALTA

WE have some experience in this country of organising medical services for areas disrupted by bombing; but Malta has had to face this task more continuously. Recounting some aspects of it Squadron-Leader Robert Hill [1] conveys an impression of breathless impermanence, of judgments quickly made and boldly carried out, but above all of growing confidence in success. He writes mainly from the viewpoint of the RAF, but, as he points out, Service difficulties in a small island cannot be divorced from those affecting civil authorities, with whom an intimate liaison has been formed.

Until April, 1941, attacks were mainly by the Italians, who were not formidable. In April of that year there were visits from the Luftwaffe, but these were soon replaced by Italian attacks, and the relative lull persisted until December, 1941, when the worst German attacks of all began, lasting till May, 1942. During that time there was a constant fight, on the ground, to maintain sanitation and hygiene and to keep the score of sickness from mounting. The military hospitals provided beds for the RAF and began building underground accommodation for patients and operating units. The advantages of dispersing hospital blocks were appreciated; the Royal Naval Hospital for example was held to be unsafe for patients. Some of the staff remained as consultants, and they had charge of medical stores, though these too were largely dispersed, so that there might be no danger of a single overwhelming loss. The Navy undertook burial of the dead, not an easy task when roads were often blocked. The dockyards provided a mobile first-aid unit capable of setting up equipment to deal with a hundred cases; and the Army supplied two field-ambulances.

A "priorities" committee was formed to decide what battle casualties, invalids and service families should have first call on aerial transport from the island. A fighter pilot likely to be able to return to duty after treatment elsewhere was given precedence, say, over a cook with tuberculosis. The patients were in the care of the Army till they reached the aerodrome, after which the RAF took them under its wings. What with the activity on the ground and the activity overhead, nights on the aerodrome were apt to be busy, but patients bore it well, and Hill regards this part of the work as successful.

Aerodrome medical services included sick-parades, hygiene and sanitation, care of flying personnel, and disposal of casualties. He notes that casualty collection proved that much time is spent by doctors in lecturing to lay bodies on first-aid: all the instruction necessary for battle areas can be given in one hour. No attempt was made to equip advanced dressing-stations or casualty reception centres with operating-theatres. Patients were given transfusions of whole blood or plasma there if they needed it, and sometimes remained in the station for 24 hours if their condition or that of the roads compelled it, but in the main casualties were taken straight to hospital. This was well borne by the patients and pleased the hospital authorities. The medical officer could not remain in comparative safety waiting for casualties to be brought to him; he had to be on call, like the fire-brigade, to go where he was wanted. Luckily, thanks to rock shelters, slit trenches, good warnings, and sensible behaviour about avoiding risks, casualties on the island have been relatively few.

GUIDE TO DRUG NAMES

THE doctor who wants to keep reasonably in touch with advances in therapeutics and yet remain sane must be well-supplied with guides through the maze of terminology. In his *Index of Modern Remedies* (second series), published by *The Scottish Chemist*, 240, Albert Drive, Pollokshields, Glasgow, S.1, at 1*s.* 6*d.*, Mr. William Mair, FCS, supplies most of the information about new drugs and diagnostic agents, their trade names, composition, uses and price, which the doctor needs. The main sections are reprinted as they appeared month by month, and at first sight are difficult to follow, but all is well if the reader takes the author's advice, always to look first at the index.

1. *East. Afr. med. J.* 1943, **20**, 35.

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IN THE DARK

OUR attention has been drawn to a luminous material, called 'Spook,' prepared in sheets which can be cut up; the pieces can be stuck on the wall near light switches or on the household matchbox, and will give enough light to indicate these elusive targets in the dark. The back of the sheet is adhesive, and protected by a backing of gauze which can be stripped off before the sheet is used. The luminosity derives from strontium sulphide, said to be made up in a new way so that the brightness and length of glow exceed Government standards for ARP luminous materials. After being exposed to daylight or artificial light for one minute it will shine brightly for 10 hours and is said to remain fairly luminous for 24 hours. It is suggested that 'Spook" could be used to mark light switches and bells in open-air wards, or in wards where the blackout is removed at night. Sheets measuring 2 in. by 3 in. can be obtained for 1*s.* 3*d.* each, but can be supplied to hospitals at 9*d.* each. The only way in which it falls short of success is in the quality of the glue backing which is not sufficiently adhesive to preserve the little square of material from being brushed off by chance. The maker is Mr. E. D. A. Byrne, 259, Grange Road, S.E.19.

FETCH AND CARRY

THE home service ambulance committee of the Order of St. John and of the British Red Cross have equipped 132 ambulance stations throughout the country and a further 379 stations are affiliated to the service. The ambulances of these 500 stations have during 1942 carried 248,689 patients. Owing to war conditions more and more patients are being nursed in hospitals rather than at home, while there is a dearth of private cars to move them, and the result has been more work for the ambulance service. By arrangement with the Ministry of Health the committee also continues to provide mobile X-ray facilities through the EMS hospitals in the London area, and a twin-unit technique is being used for orthopædic work.

Organisation of Insurance Practitioners

The Blackburn Local Medical and Panel Committee has sent a letter to all other local medical and panel committees saying that it is very perturbed by the laisser-faire attitude of the profession as a whole to the Government proposals for the reorganisation of the medical services. It believes that "this is largely due to the imperfect organisation of insurance practitioners, and that there is an urgent need to improve that organisation so that with their aid a united profession can discuss terms and conditions with the Minister." It suggests that the Insurance Acts Committee should be made into an entirely independent body, composed only of insurance practitioners in active practice. The funds subscribed to the National Insurance Defence Trust and the panel practitioners' protection fund of the Medical Practitioners Union should be placed under the control of the reorganised IAC as trustees; the IAC should have its own secretariat, operating from an independent office; and the country should be divided into regional areas in each of which a paid organiser (lay or medical) would be appointed "with a view to welding all the doctors in his area into a solid body, willing to carry out the policy laid down by the Panel Conference to the reorganised Insurance Acts Committee."

Psychiatrists' Visit to LCC Hospital

On May 26, psychiatrists of the United States and Canadian Forces in this country were entertained by the London County Council at Sutton Emergency Hospital. Short papers were read by Dr. Louis Minski on rehabilitation of the neurotic, by Lieut.-Colonel A. A. W. Petrie on psychopathic personalities, by Dr. Eliot Slater on the recognition of the neurotic in the services, and by Dr. William Sargant on physical treatment in psychiatry. A luncheon was held, at which those present included Sir Eric Salmon (clerk of the LCC), Dr. W. Allen Daley (medical officer of health, LCC), Prof. F. R. Fraser (director-general, Emergency Medical Service), Dr. O'Brien (Rockefeller Foundation) and Mr. R. Sargood (chairman, mental health services committee, LCC). The afternoon was devoted to a demonstration and talk on the electro-encephalogram by Dr. Denis Hill, visits to the occupational workshops and a talk by Dr. David Shaw, and a demonstration of electro-convulsive therapy by Dr. D. E. Sands. Colonel Thompson and Colonel Van Nostrand on behalf of the US and Canadian psychiatrists thanked the council and medical staff for having given them such a successful and interesting day.

European Association of Clinical Pathologists

At a meeting of this new association held in London on May 21 the following officers were elected: president, Dr. S. C. Dyke (England); vice-president, Prof. E. J. Bigwood (Belgium); secretary, Dr. F. Pick (Czecho-Slovakia); treasurer, Dr. B. L. Della Vida (Italy); council, Dr. A. Benau (Yugoslavia), Dr. D. C. Canné (Nederlands), Dr. F. Duran-Jorda (Spain), Prof. F. Silberstein (Austria), Dr. G. Ungar (France), and Dr. J. Unger (Czecho-Slovakia). The annual subscription, including entrance fee, was provisionally set at 10*s.* The meeting adopted rules for the association while its members are mainly in this country, and instructed the council to consider the procedure to be adopted after the liberation of Europe. A resolution was passed to the effect that free interchange of workers in clinical pathology between the nations of Europe would be an important factor both in the advancement of scientific medicine and also in the development of a common European mentality, these being the main objects of the association. A letter was received from the secretary of the British Association of Clinical Pathologists inviting members of the European association to participate in its gatherings.

Membership of the European association is open to medically qualified men and women of all European nationalities engaged in any form of medical laboratory work. Those interested should communicate with Dr. Pick, Department of Clinical Pathology, The General Hospital, Walsall, Staffs.

Conference on Maternity and Child Welfare

A national conference on maternity and child welfare is to be held at Friends House, Euston Road, London, N.W.1, on Thursday and Friday, July 8 and 9, under the chairmanship of Dr. Stella Churchill. Dr. Violet Russell and Dr. D. H. Geffen will open a discussion on nursery and family life, Dr. C. Metcalfe Brown on functions of maternity and child welfare personnel, Dr. G. F. Buchan on child care in a national health service, and Mr. Eardley Holland on the midwifery service in relation to the future. Mr. Ernest Brown, the Minister of Health, will deliver a presidential address. Tickets for the conference from the secretary of the National Association Maternity and Child Welfare Centres and for the Prevention of Infant Mortality, 117, Piccadilly, W.1.

The maternity and child welfare group of the Society of Medical Officers of Health are holding a short postgraduate course in connexion with the course on July 10. Further particulars from Dr. Russell, Town Hall, Kensington, W.8.

Society of Medical Officers of Health

A meeting of the fever hospital medical service group will be held at Tavistock House, Tavistock Square, London, W.C.1 at 3 PM on Friday, June 18, when Dr. J. A. Scott, Dr. N. D. Begg and Dr. Robert Cruickshank will open a discussion on the administrative and clinical control of diphtheria.

Royal College of Physicians of Ireland

At a meeting of the college held on June 4, Reginald Hall, T. M. Kavanagh and Brendan O'Brien were admitted to the fellowship, and Maude F. P. Bigger, A. H. Isaacson, F. F. McKee and G. S. Prince to the membership.

British Institute of Philosophy

On Friday, June 18, at 5 PM, Prof. G. C. Field will deliver a lecture at 14, Gordon Square, London, W.C.1 on Plato today. Application for free cards of admission should be made to the director of studies at that address.

The 1943 register of orthoptists may now be obtained, free of charge, from the acting secretary of the Board of Registration of Medical Auxiliaries, BMA House, Tavistock Square, London, W.C.1.

Dr. W. J. TYSON of the Colonial Medical Service is now officially reported to be interned at Singapore.

On p. 702 of our last issue Dr. F. R. G. Heaf should have been described as principal assistant medical officer LCC.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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PRIMARY ATYPICAL PNEUMONIA

W. R. M. DREW, OBE, M B SYDNEY, M R C P, D T M & H
LIEUT.-COLONEL RAMC

ERIC SAMUEL, M D LOND, F R C S, D M R E
MAJOR RAMC

MARGARET BALL, M B CAMB, M R C P
CAPTAIN RAMC

(Illustrations on Plate)

THE term "primary atypical pneumonia" is applicable to pneumonic consolidations other than those caused by any known virus, rickettsia, bacterium or chemical agent. The disease is characterised by a gradual onset, few physical signs, and varying radiological changes in the lungs, and its course is almost always benign.

Despite the recommendation of the American Surgeon-General,[1] we feel that the name is unsatisfactory. The word "pneumonia" is associated in the lay mind with a serious illness and protracted convalescence, and its use may lead the patient to exaggerate the severity of his illness. But until the cause is discovered it is unlikely that a completely satisfactory name will be found.

Though only recently recognised as an entity, the disease is not new, and extended use of radiography in influenza-like conditions will probably lead to its more frequent recognition. This has happened in the Services, and there is no reason to think the infection less common in civil life. Surveys by miniature radiography may reveal symptomless cases. The X-ray changes in the lung parenchyma are often surprising in relation to symptoms.

HISTORICAL

There can be little doubt that clinical descriptions of this disease were given as early as 1861[2-4]. Few cases of the same kind were reported until 1933 when they were observed in America, France and Spain.[5-7] In the intervening period various similar conditions had been described (catarrhal fever, soldier's pneumonia, purulent bronchitis, acute pneumonitis and interstitial pneumonia)[8-18] and some of these may have been primary atypical pneumonia. On the other hand, the presence of purulent sputum, tachycardia and cyanosis suggests that others [8 9] were not.

In 1935 Bowen [10] recorded an outbreak of acute influenzal pneumonitis in a military camp in Hawaii. A year later Allen [20] in the United States described an identical condition which he labelled acute pneumonitis. In this country, Scadding,[21] in 1937 and Scadding and Ramsay [22] in 1939, gave an account of a group of cases, some of which were undoubtedly examples of primary atypical pneumonia. Cases were seen in children [23] as well as older people.[24] Reimann [25] in 1938 recorded an outbreak and called it atypical pneumonia.

The frequency of the disease in young adults was shown by reports of outbreaks in American colleges [26-31] which appeared between 1938 and 1940, but Daniell's [32] account of 13 cases at a girls' school shows that it is not confined to young adults. Other observers have recorded groups of cases in the general population.[33-39]

EPIDEMIOLOGY

Seasonal incidence.—Many workers have noted a seasonal incidence. Some have found the maximum number of cases in their series in November,[31 37 40 41] while others [35] say that their peak months were February and March. The two groups agree that the seasonal incidence does not run parallel with that of pneumococcal pneumonia. Indeed, in the experience of McKinley and Cowan [30] it followed that of the bacterial pneumonias and infections of the upper respiratory tract. Sporadic cases have also been described.[25 31 35 37]

In our series of 50 cases the month of onset was as follows:

Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*
4	5	18	6	2	2
July	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1	1	2	4	0	5

Age and sex.—Most of the reported cases have been in young adults; less commonly children and the aged are affected.[23 24 42] Our own patients were drawn from men and women of military age. There seems to be no predilection for either sex.[36]

Mode of spread.—Apparently the disease is spread by droplet infection,[31 39] since it has developed in persons attending established cases,[33 36 37] and in families.[26] Nevertheless, in our series, the infectivity seemed to be low, only one instance of contact infection being noted.

POST-MORTEM AND LABORATORY FINDINGS

Fatal cases of primary atypical pneumonia are very rare, but have been reported.[30 36 37 43 47] The essential lesions were an interstitial bronchopneumonia and a concomitant bronchitis. The lungs showed adjoining areas of collapse, consolidation and emphysema, while the bronchi were filled with mucopurulent exudate.

Histologically, infiltration of the interalveolar septa with mononuclear cells has been a constant finding. The alveolar exudate consisted of mononuclear cells, whereas in the exudate filling the bronchi polymorphonuclear cells predominated.

The leucocyte count is usually normal or slightly raised, with a relative increase in mononuclear cells.[44 45] Examination of the blood in our series confirmed these findings. Following severe illness a secondary anæmia has been described.[36]

The erythrocyte sedimentation-rate is raised,[36] as a rule, during the acute phase. The characteristic features of the sputum are the presence of mononuclear cells and the normal bacterial flora.[36] Blood-culture yields no growth. It is not uncommon for a transient positive Wassermann reaction to be observed.[36 45] Heine and Brown [46] have reported an increase in the protein and cellular content of the cerebrospinal fluid in a few instances.

ÆTIOLOGY

As yet no single cause for primary atypical pneumonia has been discovered. There are, however, conditions showing similar lung changes which suggest a number of ætiological factors.

Relationship to known virus diseases.—Most cases of psittacosis show lesions in the lungs, and many of the symptoms, physical signs and radiological findings are similar to those seen in primary atypical pneumonia. Further points of similarity in these two diseases are the changes in the blood and the pathological appearances of the lung in fatal cases. The antibody response of the blood in some cases of primary atypical pneumonia is identical with that found in psittacosis.[47 50] The severity of some outbreaks of this disease contrasts with the mild course of primary atypical pneumonia; but as Finland and Dingle [48] suggest, this may be because different age-groups are affected. In view of the recent discovery by Andrewes and Mills [49] that psittacosis virus is widespread in pigeons in this country and its possible presence in domestic animals,[50] failure to obtain a history of contact with sick birds is of little significance.

The blood may be examined for the presence of psittacosis antibody by the complement-fixation test,* However, a single test is not good proof as close relationship exists between several viruses. For positive diagnosis the demonstration of a rising titre [51 94] in the blood is desirable. A single examination is of some value, but an anamnestic reaction may occur in patients who have previously had a psittacosis infection.

That pulmonary lesions,[52] indistinguishable from those of primary atypical pneumonia, can be produced in animals by many other viruses is additional evidence that this disease is caused by a virus. On the other hand, though close antigenic relationship has been shown to exist between the viruses of meningo-pneumonitis,[53-55] lymphogranuloma inguinale [55-57] trachoma [56] and psittacosis, lung lesions are rare in all except the last. In the majority of cases of primary atypical pneumonia there is no evidence that any of the above-mentioned viruses are implicated.

Relationship to influenzal pneumonia.—Despite the frequency with which Pfeiffer's bacillus was reported as the cause [58-61] of the pandemic of 1918–20, this organism was not found in some fatal cases.[62 63] These and other observations suggested that this organism was a secondary invader. It remained for Smith, Andrewes and Laidlaw [64] in 1933, and Smith and Stuart-Harris,[93] in

* Prof. S. P. Bedson examined the sera of 15 of our cases and in 4 found psittacosis antibody in significant amounts. One of these cases showed a fourfold rising titre.

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1936 to prove that the cause of influenza was a virus which they and others [65] labelled influenza virus A. In the epidemic of 1936–37, Stuart-Harris [66] isolated a virus identical with virus A from the sputum of patients suffering from influenza. Other observers working in England and the United States [67-70] identified a virus from an epidemic of influenza in 1940–41 which was also virus A.

A second virus was isolated by Magill [71] from influenzal and upper respiratory infections in 1940. This was named virus B. A third type giving an identical clinical picture was discovered by Horsfall [72] in 1941 and named virus X.

This work on influenza has proved conclusively that lung lesions may be caused by a virus, but attempts to establish a relationship between the influenza virus and primary atypical pneumonia have failed.

Relationship to rickettsial pneumonias.—Cases of a previously unrecognised disease in slaughter-house hands, with a clinical picture resembling primary atypical pneumonia, were described by Derrick [73] in 1937. The causative agent, a rickettsia investigated by Burnet [74 75] was named *Rickettsia burneti* by Derrick.[76] In Australia further outbreaks [77] of the disease, now called Australian Q fever, were traced to the same agent.

An outbreak of "pneumonitis" in institutional workers in Washington was found by Dyer, Topping and Bengston [78] to be caused by a rickettsia. The infection was introduced by a worker returning from a laboratory in Montana where he had handled infected animals and tissue cultures. This disease has been called American Q fever, and the causal agent *R. diaporica.*[79] Lung lesions resembling those of primary atypical pneumonia are seen in this disease, in typhus fever,[80] and more rarely in Rocky Mountain spotted fever,[81] South African tick-bite fever [82 83] and experimentally produced fièvre boutonneuse.[84]

CLINICAL FEATURES

The 50 cases on which this paper is based are drawn from Service personnel of both sexes admitted to two military hospitals between January, 1941, and April, 1943. The youth and good general health of all the patients may be partially responsible for the benign course of the disease.

Incubation period.—Most investigators have surmised that the incubation period is between 7 and 21 days.[32 36 39] In our series no estimate has been possible.

Onset.—Of gradual onset, the presenting symptoms in this series fell into three groups. Commonly the illness started with symptoms simulating influenza; less frequently with those of an upper respiratory infection; and occasionally with hæmoptysis, or pain in the chest or abdomen. Other observers have described cases discovered only on routine X-ray examination of the chest.[40]

The influenza-like onset was characterised by headache, shivering, malaise and generalised aching pains in the back and limbs. Cough was often absent at first in this group and developed after about 2–5 days. In one of our cases headache was sufficiently severe to give rise to a diagnosis of cerebrospinal fever. Usually, however, the headache (retro-orbital or frontal in distribution), was only moderate, though it often persisted for a week or more.

In cases of the second group, coryza, painful throat, retrosternal soreness and an irritating cough were the presenting symptoms. In some patients radiography of the chest was performed only because of persistent cough or pyrexia and resulted in the unexpected discovery of an area of consolidation.

In a small number of patients the early symptoms did not fall into either of these two groups. Two had an exacerbation of a chronic cough and were admitted for investigation of possible pulmonary tuberculosis. Another had a sudden onset of pain on respiration and coughing; two others gradually developed pleuritic pain, confirmed by the presence of pleural friction. Dingle and Finland [45] stated that gastro-intestinal symptoms are rare, but two of our patients complained of abdominal pain which may or may not have been connected with their chest condition. Another had diarrhœa for three days before other symptoms developed.

Symptoms.—The cough has been described as characteristic, being paroxysmal and harassing,[37] and requiring codeine or heroin to control it. Few cases in our series showed this symptom, and in the majority cough was persistent rather than harassing.

American physicians,[36 40 86] describe the sputum as scanty, tenacious and mucoid at the onset, but profuse and purulent later. In most of our cases the sputum was mucoid; in some it was later mucopurulent. Profuse purulent sputum was not seen. In 3 cases there was a frank hæmoptysis of one drachm or more, and in one the sputum was bloodstained. Rusty or prune-juice sputum has never been reported[45] in primary atypical pneumonia and its occurrence should suggest that the diagnosis be reviewed.

Pain in the chest was fairly common. Retrosternal soreness was often present in cases with an onset suggestive of an upper respiratory infection, and was identical with that found in simple tracheitis. Other patients had a continuous nagging pain on the side of the lesion. True pleuritic pain was uncommon. Kneeland and Smetana [36] state that in their experience dry pleurisy did not occur, although Longcope [37] described two instances and Ramsay and Scadding [32] one. Four of our patients developed pain increased by respiration and coughing, and in three of these its pleuritic nature was confirmed by finding pleural friction.

Physical signs.—Dyspnœa or tachypnœa are rare and were not observed in our series. Cyanosis is also uncommon and was seen only once. Many cases showed a relative bradycardia, which—associated with pyrexia, headache and paucity of physical signs—might lead to a mistaken diagnosis of one of the enteric group of fevers.

Cases of primary atypical pneumonia may be afebrile throughout, but pyrexia of 100–102° F., subsiding by lysis in 7–10 days, is usual. The average duration of fever in our patients was 6 days and the maximum 16 days: but other writers [36] describe cases in which fever lasted 3–8 weeks. Herxheimer and McMillan [85] reported a second rise of temperature and we have noted this on many occasions.

Injection of the fauces without tonsillar enlargement has been recorded by many writers [37 45]: many of our patients showed pharyngitis but also, in four cases, frank tonsillitis. A diagnosis of tonsillitis was made in one of these until persistent cough and the appearance of physical signs at one base led to further investigation.

Physical signs in the chest were absent or scanty and were often late in developing. The most characteristic was a shower of sticky râles associated with only slight impairment of percussion note. Signs of consolidation, such as occur in lobar pneumonia, were uncommon, and bronchial breathing was heard in only three of our cases. Localised physical signs were commoner in those with an influenzal onset, than in those with initial symptoms of an upper respiratory infection; in most of the latter the signs were absent or consisted of scattered râles or rhonchi. As a rule physical signs had almost disappeared within a fortnight of the onset.

Course and duration.—Some observers [36 37 46] report cases in which the course is prolonged and the illness severe, the patient requiring oxygen therapy for several days. In our series all cases ran a simple course, the average period in hospital being 33 days. The disease is rarely fatal unless it is associated with some other condition such as chronic heart disease.[37]

Complications.—Encephalitis,[46] meningism,[44] rashes,[51] jaundice,[36] otitis media,[45] and small pleural effusions [44] have all been described. Three of our patients developed otitis media, and one an antral infection; one had a morbilliform rash in the second week with a secondary rise in temperature, but these were probably the result of sulphanilamide therapy.

RADIOGRAPHIC SHADOW AND CLINICAL PICTURE

Most cases with an influenzal onset showed moderate or large shadows. Pain in the chest seemed to be associated with small, often circumscribed, radiological lesions.

No relation was observed between the extent of the pulmonary lesion seen on the radiogram and the severity of the cough; only in one case with marked radiological changes was this symptom distressing. Nor does the duration of the fever correspond with the size of the radiographic shadow: two cases with small lesions had

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pyrexia for 10 and 11 days, whilst others showing large shadows were afebrile throughout.

Our findings support the opinion [19 21 22 31 32 36 37] that there is no typical radiological appearance. Several authors have commented on the variation in size and shape of the lesions. In our series their site and extent varied, but they were usually less extensive than those described by American workers.[36 37 51]

The lower lobes were most commonly involved, but lesions were sometimes seen in the upper lobes. Certain areas of the lung show a predilection for the disease. The cardiophrenic angles, especially the left, were common sites for consolidation. The pulmonary lesion was often found sitting on the diaphragm. Lesions in this site were often surrounded by normal lung markings.

The size of the lesion varied as much as the clinical severity of individual cases. The lesion was generally confined to a segment of an individual lobe and rarely involved the whole lobe. Maxfield [35] noted bilateral involvement in 20% of cases, and 6 of our cases showed lesions in both lungs.

Cases were divided into two main types depending on the radiographic character of the lesion. The majority, comprising the first type, showed a woolly area of consolidation varying from a patch, the size of a shilling (fig. I on plate), to partial or complete involvement of a lobe (figs. II and VI). The area of consolidation was less dense and more mottled than in pneumococcal pneumonia. The outline was indefinite, unless it abutted on an interlobar septum when the edge was quite sharp. In many of our cases there seemed to be normal lung markings between the pulmonary lesions and the enlarged hilar glands. This is contrary to the experience of Dingle and Finland,[45] who described the lung lesions as commencing at the hilar shadow and spreading into the lung field. It was surprising that the most extensive area of consolidation met with in this series was in the subpleural portion of the right lower lobe, separated from the enlarged hilar shadow by an area of apparently normal lung (fig. VII).

Sometimes there are multiple areas of patchy consolidation as described by Scadding [21]; nine examples were noted in this investigation. The lesions may not be at the same stage of development, one resolving while another progresses.

The second type of radiographic appearance comprised cases in which the affected area showed marked reticulation (fig. VIII). This lesion always radiated from, and was usually more conspicuous near, the hilar region. The reticulation was coarse, but its pattern may be overlaid by a diminished translucency which gives a ground-glass appearance to the affected lobe. Of our 50 cases, 18 showed this reticular type of lesion. A generalised reticulation in the lung fields has previously been noted in some virus diseases, notably influenza.[87]

It is possible that the two types described above may represent different stages in the development of the lung lesion. If this be so, then, on analogy with pneumococcal pneumonia, the reticular pattern would presumably be a stage of resolution. It is difficult to reconcile this hypothesis with the radiographic course of one of our cases in which radiography soon after admission showed ground-glass mottling of the whole of the middle and lower zones of the right lung, while later reticulation, and finally consolidation appeared in the same area (figs. X–XII).

Enlargement of the hilar shadows was observed in the great majority of our cases. This has the characters of enlarged glands—namely, a shadow with an ill-defined outline and translucency of the normal hilum. In 17 cases the adenopathy was bilateral, and greater on the side of the lesion.

The diagnosis from other diseases with similar radiographic appearances may be extremely difficult. Kornblum and Reimann [88] described the radiographic appearances of acute tracheobronchitis which they felt represented an infection similar to primary atypical pneumonia. Both hilar shadows were enlarged and the lung markings were hazy. The similarity of acute tracheobronchitis to primary atypical pneumonia with reticulation will be obvious. In primary atypical pneumonia the lesion is more localised than in acute tracheobronchitis or influenza; nevertheless in cases of bilateral lung involvement the diagnosis may be difficult.

The first type of woolly mottling (fig. IX), when it occurs in the upper lobe, may cause difficulty in differential diagnosis from pulmonary tuberculosis.[92] Useful distinguishing features are the greater enlargement of the hilar glands in primary atypical pneumonia than in early tuberculosis. Secondly, the striation extending from the consolidated area to the hilar shadow is less marked in primary atypical pneumonia. The resemblance between these two types of lesion may be increased by a rare occurrence of pseudocavity formation in resolving primary atypical pneumonia. The differential diagnosis then rests on serial films taken frequently. If the first radiogram shows pseudocavity formation the diagnosis on a single film may be impossible.

A lung abscess in the upper lobe may also give rise to difficulty. Until the abscess has liquefied the two conditions may be indistinguishable.

Pneumococcal pneumonia which has been inadequately treated with sulphonamide may show a reticular pattern in the lung with enlargement of the hilar glands, and its resemblance to the reticular type of primary atypical pneumonia may be striking. Rapid disappearance of the lesion suggests the latter disease.

Should progress films show no appreciable change, the possibility of an area of bronchiectasis must be considered. Small congenital abnormalities of the bronchial tree are not uncommon, and they are prone to infection with a surrounding pneumonitis. In such cases examination with iodised oil will demonstrate the nature of the lesion. During our investigation we encountered a case of this kind.

DIFFERENTIAL DIAGNOSIS

Though the clinical picture in primary atypical pneumonia may be characteristic, diagnosis from allied conditions loosely classed as influenza can only be made with certainty by radiography. In "influenza" there is usually less fever, and X rays show no abnormal shadows in the chest. We have seen cases however with symptoms and signs akin to those of primary atypical pneumonia in which we could find no lung lesions, and these may represent a milder form of the same disease.[38]

Pneumococcal pneumonia can be distinguished by its dramatic onset, and by the pleuritic pain, herpes labialis and constitutional disturbance; demonstration of a leucocytosis, and pathogenic pneumococci in the sputum, establish the diagnosis. But when pneumococcal pneumonia is modified by inadequate sulphonamide therapy there may be an incomplete fall in temperature, with diminution in white cells and disappearance of pneumococci from the sputum, and such cases closely resemble primary atypical pneumonia. Joules [89 90] has lately shown that though the pneumococcus disappears from the sputum with small doses of sulphonamide drugs, its presence may still be demonstrated by lung puncture. Inefficient chemotherapy thus sterilises the sputum but not the actual pneumonic lesion in the lung parenchyma. Careful consideration of the history and of the amount of drug administered may enable the correct diagnosis to be made. It is important to differentiate between these two conditions, for inadequately treated pneumococcal pneumonia may cause pulmonary fibrosis, whereas primary atypical pneumonia does no permanent damage.

Several of our patients were suspected, on clinical or radiological grounds, of having pulmonary tuberculosis, but rapid resolution of symptoms, signs and X-ray shadows indicated the correct diagnosis.

We have already referred to a type of bronchiectatic lesion liable to cause confusion. This gives rise to few symptoms; the physical signs may resemble those of primary atypical pneumonia; and examination of the sputum and blood are of little help. Bronchography is therefore necessary.

TREATMENT

Various authors [40 44 91] have advised isolation of the patient. This precaution was not taken in our series, and only one instance of possible contact infection was noted, this being in a nurse. Perhaps most patients had ceased to be infectious before admission.

Patients suffering from primary atypical pneumonia should be confined to bed until the fever has subsided. Convalescent treatment need not be delayed until the chest is radiologically clear, but it is essential that

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radiography should show complete resolution before the patient returns to duty.

There is no specific treatment. Cough is occasionally difficult to control even with codeine phosphate and linctus heroin. Sulphonamide drugs have no influence on the course of the disease and should not be administered.

ILLUSTRATIVE CASES

CASE 1.—A corporal, aged 22, was admitted on Jan. 30, 1943, complaining of irritative non-productive cough for one month, with malaise and vague pain in the left chest for 24 hours. Next day the pain became pleuritic. Examination immediately after admission showed temperature 100·2° F., pulse 70 and respirations 20, with audible friction in the left axilla as the only positive sign. The temperature fell to normal on the following day. Two days later symptoms and signs, apart from the cough, had disappeared. The cough persisted for a fortnight remaining non-productive.

The day after admission a blood-count showed 10,300 white cells (polymorphs 66%, lymphocytes 29%, monocytes 3%, eosinophils 1%, basophils 1%). Radiography revealed a small area of consolidation in the left lower lobe (fig. I). Four days later resolution was almost complete. Treatment was symptomatic. The patient was discharged to duty on Feb. 18.

CASE 2.—A gunner, aged 34, complaining of slight cough and a burning epigastric pain after food for three days, was admitted on Feb. 8. Three days before admission he had a hæmoptysis of one drachm of bright red blood which was followed by staining of the sputum for two days. The cough was not marked and the sputum scanty and mucoid. There was no previous history of dyspepsia. He was afebrile and looked well on admission. Except for mild emphysematous changes no abnormal physical signs were noted in the chest. Slight epigastric tenderness was present.

The sputum showed no pathogenic organisms. The white cells on the day after admission showed 12,300 (polymorphs 58%, lymphocytes 40%, monocytes 1%, basophils 1%). On the second day radiography showed a generalised ground-glass appearance in the right upper, middle and lower lobes (fig. X). Six days later the ground-glass appearance was slightly less evident (fig. XI). Five days after this a small area of consolidation was noted in the axillary part of the right upper lobe adjoining the minor interlobar septum (fig. XII). A month from the onset the lung fields were normal.

CASE 3.—A private, aged 19, was admitted on April 16, 1942, complaining of three days' fever, mild abdominal pain, slight cough and sputum. The temperature was 102° F. on admission; the throat showed granular pharyngitis with small infected tonsils. Physical examination of the chest and abdomen was normal. He was treated with sulphapyridine 3 grammes statim followed by 2 g. four-hourly. Two days later the cough was worse, and he developed râles at the apex of the right lung. The fever did not respond to sulphapyridine, which was discontinued after three days owing to hæmaturia. A fortnight later he was symptom-free but debilitated. All physical signs in the chest had disappeared. The sputum showed a mixed bacterial flora and the white-cell count was 10,600 (polymorphs 75%, lymphocytes 25%, monocytes 1%, eosinophils 1%). The blood sedimentation-rate was 5 mm. in one hour. He was discharged to convalescent home on June 1 and returned to duty on July 17 (figs. IV, V, VI).

CASE 4.—A woman medical officer, aged 30, was admitted to hospital on March 1, 1943, with aching pains in limbs of six days' duration. Five days before admission she developed retrosternal pain associated with cough and scanty sputum. On admission T. 100° F., P. 74, and R. 22. An outstanding feature at this time was apathy and mental depression. Prolonged expiration and a few râles developed at the left base seven days after admission. Three weeks later a nurse attending this patient developed the disease.

The temperature subsided on the 11th day. The sputum showed mixed bacterial flora and a few pneumococci. Radiography on March 4 showed a mottled opacity in the left mid-zone, wedge shaped with indefinite outlines (fig. II). The left hilar glands were moderately enlarged. Eleven days later residual striation was present in the affected area (fig. III). The hilar glands were still enlarged but less than in the previous film. The patient returned to duty on April 4 after sick-leave.

CASE 5.—A private, aged 35, was admitted on Feb. 22, 1941, with influenza-like symptoms of six days' duration. He also complained of loss of weight, night sweats, and retrosternal pain. The only physical signs were a few crepitations at the apex of the right lung; radiography showed mottling (fig. IX). A month after admission the physical signs had disappeared and throughout the illness he was afebrile. He remained in hospital for 57 days, this long period being due to the necessity of refuting an original diagnosis of pulmonary tuberculosis.

CASE 6.—A private, aged 40, was an inpatient under treatment for a fracture of the left tibia and fibula, when he developed a "choked feeling" in the chest, lassitude and cough. He had noticed soreness of his throat for several days before these symptoms developed. The sputum at first was scanty and mucoid; later it became profuse and mucopurulent. At the onset T. 100·4° F., P. 108; the tonsils were enlarged. Physical signs were absent until the 7th day when a few râles were heard which disappeared on coughing. The fever subsided on the fourth day. A secondary rise to 99° occurred on the 7th day and again on the 12th day.

The white-cell count five days after the onset was 8500 (polymorphs 54%, lymphocytes 36%, monocytes 8%, eosinophils 1%). Throat swab and sputum showed mixed bacterial flora. The blood Wassermann was a doubtful positive. A chest radiogram on March 16 showed massive consolidation in the peripheral portion of the right lower lobe (fig. VII). Both hilar glands were moderately enlarged. Four days later no appreciable change could be seen. On April 15 slow resolution was apparent.

CASE 7.—A private, aged 30, was admitted following the sudden onset of pain in the right side of the chest 24 hours previously. This was aggravated by breathing and was associated with frontal headache and cough. The sputum was scanty and tenacious. T. 100·4° F.; P. 120; respiration-rate normal. Chest examination showed an impaired percussion note and localised coarse râles at the right base with pleural friction. Rhonchi general. The pain disappeared on the 3rd day, but the headache persisted for a week, and the local physical signs for several weeks. The fever had subsided by lysis by the 11th day. The white-cell count on admission was 9000 (polymorphs 79%, lymphocytes 18%, monocytes 2%, eosinophils 1%). The sputum showed mixed bacterial flora.

Two days after admission radiography showed a small rounded opacity in the right cardiophrenic angle (fig. VIII). No enlargement of the hilar glands was noted. Ten days later the opacity showed resolution with enlargement of the right hilar shadow. The right diaphragm was raised. The lung fields were normal 24 days after the first film. A bronchogram showed a normal bronchial tree in the region affected. The patient was discharged to convalescence after 54 days in hospital.

SUMMARY

1. This account of primary atypical neumonia is based on a survey of the literature and on 50 cases personally observed in Service patients between 1941 and 1943.

2. The cause of the condition is unknown, but the resemblance of the lung lesions to those of certain virus and rickettsial diseases suggests a similar ætiology.

3. The disease is probably commoner than is generally recognised, since at the present time a definite diagnosis can be made only by X-ray examination.

4. Clinically or radiologically, it may be confused with influenza, pulmonary tuberculosis, bacterial pneumonia, or bronchiectasis.

5. In this series the main clinical features were cough, headache, malaise and fever, associated with areas of consolidation in the lung field.

6. There was no polymorphonuclear leucocytosis in the blood and pathogenic organisms did not predominate in the sputum.

7. The illness ran a benign course, ending in complete resolution of the lung lesions.

8. No drugs are known to have any influence on the course of the disease.

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RELATION OF COLD AGGLUTININS TO ATYPICAL PNEUMONIA

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IT has been found recently that during the course of primary atypical pneumonia remarkable amounts of cold agglutinin appear in the blood.[22] The observations were limited in scope yet indicated a regularity in the occurrence of this phenomenon sufficient to warrant its comprehensive study. We have now had the opportunity to examine the serum of more than 200 patients suffering from a variety of disorders, including many types of bacterial and non-bacterial infections. This experience lends strong support to the belief that there exists a close association between atypical pneumonia and the cold agglutinins. Moreover, it appears that common bacterial infections, including those of the respiratory tract, influence the titre of cold agglutinin in the blood slightly, if at all, and are thus distinguished serologically.

Several problems of clinical and immunological interest arise from these relationships. Not the least of them is the comparative behaviour of the cold agglutinins in atypical pneumonia as opposed to secondary bacterial bronchopneumonia and to pneumococcus lobar pneumonia, inasmuch as any serological distinctions that could be demonstrated to exist among these diseases might assist materially in their classification. Indeed, it is the present difficulty in the precise delineation of atypical pneumonia that necessitates a long and cautious survey of the clinical and bacteriological findings in many cases of pneumonia before final conclusions may be set forth. Meanwhile a knowledge has been gained of the development of the cold agglutinins in atypical pneumonia sufficient to portray the temporal relation of their appearance to the onset of disease. This consideration proves to be of such import for any further studies that it may be treated first and separately, and forms a good part of the substance of the present communication.

NATURE OF COLD AGGLUTININS

The cold agglutinins have occupied such a relatively unexplored corner of immunology, and their relation to the more familiar orthodox antigen-antibody systems has received so little attention, that a preliminary discussion of their definition becomes necessary.

It has long been known that in addition to the classical iso-agglutinins that mark the four primary blood-groups of man, there exist in many normal human sera other substances which may cause clumping of erythrocytes and are called "cold" agglutinins because their action appears usually at low temperatures only and is dispelled by warming to 37° C. Specific cold agglutinins concerned with sub-groups of type A blood have been described.[11] On the other hand there are cold agglutinins which will produce clumping of red cells irrespective of group and

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are therefore looked upon as non-specific. Since they likewise affect the cells of the individual in whose serum they appear, they have also been termed "auto-agglutinins." In normal human serum the amount of these substances is generally enough to produce only a delicate reaction which disappears upon dilution beyond 1 : 10 or 1 : 20.

Auto-agglutinins of this type have attracted the attention of physicians from time to time when they have been manifest even at room temperature and so interfered with the cross-matching of blood for transfusion. Such occasions are rare; in the routine examination of 10,000 specimens of blood, Shooter found 29 exhibiting a cold agglutinin active at a temperature of 19°–23° C.[19] The state of health of the donors is not stated, though usually in the past the phenomenon has been noted in association with illness. Among the diseases represented in the literature are syphilitic or hypertrophic cirrhosis of the liver,[13] hæmolytic icterus,[24] secondary anæmia of pregnancy,[8] pernicious anæmia,[6] pneumonia,[2 5 18 22] and leukæmia.[1 3 16] In each of these conditions the number of case reports is small, and the total of the entire lot is probably not greater than 38.[15] Cohen and Jones observed auto-agglutination in a patient with pernicious anæmia. They thereupon examined the blood of 300 more individuals among whom there were examples of pernicious anæmia, cirrhosis of the liver, hæmolytic icterus, and secondary anæmias, but failed to find auto-agglutinins again.[6] Auto-agglutinins of high degree thus would appear to occur rarely and without regularity in a number of diseases that are unrelated nosologically.

On the other hand, there are at least two human disorders in which auto-antibodies acting at low temperatures upon the homologous erythrocyte are found with such uniformity that the reaction may be employed as a diagnostic measure. They are paroxysmal hæmoglobinuria and trypanosomiasis. In the first of these conditions the immunological mechanism is both familiar and specific, being intimately concerned with the clinical manifestations. In human trypanosomiasis it has long been known that auto-agglutination occurs frequently, and in ordinary cover-glass smears of blood masses of clumped cells may be seen.[4 21 25] Yorke[25] studied the serum of animals infected with various species of trypanosomes and demonstrated the regular development of a cold agglutinin most effective at 0° C. and inactive at 37° C. He showed, moreover, that there was no correlation between the degree of anæmia and the presence of the agglutinin, and concluded, "In the light of the information obtainable a well-marked degree of auto-agglutination of the red blood-cells is an extremely rare occurrence, apart from infection with trypanosomes." The relation of these more or less specific auto-antibodies to the non-specific cold agglutinins will be considered later in the present paper.

Meanwhile, it should be pointed out that on the basis of our present knowledge one is hardly justified in the assumption that the non-specific auto-agglutinins or cold agglutinins as described in the literature represent a single agent. There are striking similarities in behaviour, yet in the reports of the cases showing agglutinin interfering with the cross-matching of blood the thermal amplitude of activity is often omitted from the data. Moreover, in the instances in which attempts were made to study the range of biological activity of the agglutinins there appear to be differences from case to case. Thus, the effect on rabbit cells is described as both greater [6] and less [5] than on human cells. Another contributor found that his patient did not belong to any of the known blood-groups, and while the serum acted upon the individual's own cells in the titre 1 : 1600, it had a much less powerful effect on cells of group A and group B.[24] Furthermore, in contrast to the situation obtaining in the human subject, an auto-agglutinin produced experimentally in rabbits by repeated withdrawal of blood is shown to be as efficacious at 22° C. as at 0° C.[17] However, for practical purposes the criteria generally laid down for the definition of non-specific cold agglutinin may be accepted.[23] These are generally taken to be (*a*) that activity is greatest at 0°–5° C. and diminishes as temperature increases, disappearing entirely at 37° C., and (*b*) that the effect extends to human erythrocytes of all blood-groups and usually to a variety of animal cells as well.

SEROLOGICAL METHOD

In the investigations presented here a quantitative titration of the cold agglutinin in 421 samples of blood from 219 individuals was carried out. The serum was generally allowed to separate at room temperature.* In some instances, the blood was placed at 37° C. soon after withdrawal from the subjects and kept at this temperature until clot-retraction occurred, whereupon it was quickly centrifuged and the serum removed. It soon appeared, however, that while the latter method of manipulation did result in a slightly higher titre of agglutinin, it was for various reasons inconvenient. Moreover, the magnitude of the difference so detected was slight and insufficient to affect materially the gradient of the change seen in atypical pneumonia.

Serial dilutions of 0·3 ml. serum in equal amounts of saline solution were made in small test-tubes. 0·1 ml. of 3% suspension of washed group O human erythrocytes was added to each tube and the racks were set in a refrigerator maintaining a temperature of about 5° C. On the following morning readings were taken immediately upon removal of the tubes from the cold.

Agglutination was observed by first flipping the tube to see if a solid disk of agglutinated cells had formed. The end-point of highest titre was defined with the aid of a hand lens after the deposit of cells had been resuspended in the fluid by rapid back-and-forth rotation of the tube while it was being held vertically between the palms. This is essentially the method commonly employed to read specific immune agglutinations, such as that of sheep cells in the well-known test for infectious mononucleosis. A definite correlation could be demonstrated between the formation of a disk and the height of titre. With sera containing a normal amount of cold agglutinin disks are almost never seen even in the low titre 1 : 2, whereas they may be found in several tubes if titre is high.

Upon finding an abnormal titre, in order to ensure that the reaction was dependent on low temperature, the system was transferred to an incubator at 37° C. and a reading taken after the cells had settled. Whenever possible the serum was also set up against the individual's own cells to demonstrate auto-agglutination. This test was performed in about one-fourth of the cases showing a high titre of cold agglutinin for group O cells and in every instance an auto-agglutinin of approximately equal power was exhibited.

The group O cells used were obtained from a small number of normal individuals. The blood type of these donors was determined by the use of human sera chosen for their high content of iso-agglutinins.

SELECTION OF CASES

The patients include adult civilians as well as members of the armies of Great Britain and the United States, and they came under observation during the period May, 1942–March, 1943. The numerical distribution according to final clinical diagnosis is shown in the table. Many of the

CLINICAL DIAGNOSES IN CASES EXAMINED FOR COLD AGGLUTININS

Diagnosis	*No. of cases*	*No. of samples of serum examined*
Atypical pneumonia	83	166
"Influenza" or "grippe"	39	61
Upper respiratory infections	26	42
Pulmonary tuberculosis	15	19
Mumps, uncomplicated	13	39
Measles	11	32
Pneumococcus infection	10	24
Typhus, murine	4	7
Mumps with orchitis	4	15
Toxic hepatitis	4	6
Chronic osteomyelitis	3	3
Infectious mononucleosis	2	2
Pyelitis	1	1
Psoriasis	1	1
Rheumatoid arthritis	1	1
Lymphogranuloma venereum	1	1
Wassermann positive, pooled	1	1
Total	219	421

* More than 150 specimens representing a number of respiratory infections were kindly placed at our disposal by Major T. F. McNair Scott, whose foresight was responsible for their preservation several months before the present study was begun.

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cases were seen by one or another of us (S. N., J. C. T.) and in the remainder the records were carefully examined. In a few instances, notably the cases of typhus fever,† and of proved influenza "B"‡ the esesential data were supplied by other laboratories. The diagnosis of pneumonia was always confirmed by X-ray examination of the lungs. Other appropriate laboratory procedures were carried out whenever possible.

RESULTS

With the immunological method employed, we have found that the titre of cold agglutinins in normal serum is usually low and rarely exceeds 1 : 16. Among the disorders so far examined a regular elevation above this level has so far been found only in atypical pneumonia and in mumps complicated by orchitis.

If, for the moment, the assumption be made that in the present survey the clinical diagnosis as recorded in the hospital chart is correct and definitive, a first approximation to the contrast between atypical pneumonia and other diseases may be obtained by random sampling without regard either to errors due to method or to any other factors that may be shown subsequently to influence the titre of cold agglutinin.

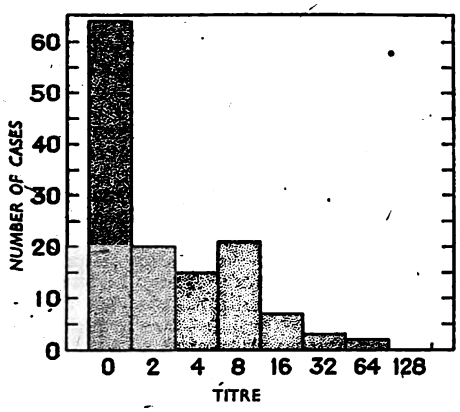

Fig. 1—Maximum titre of cold agglutinins in 132 cases of miscellaneous infections used as controls.

In fig. 1 we have indicated graphically the maximum titres reached in all of the cases other than atypical pneumonia and mumps with orchitis. It will be seen that in only 5 of the 132 did the level exceed the normal limit of 1 : 16, and in none is it above 1 : 64. In fig. 2 the titres in 83 unselected cases of atypical pneumonia are exhibited. More than half (44) possess a titre of at least 1 : 32, and 23 (28%) run out to 1 : 128 or beyond. It may be concluded that in so-called atypical pneumonia, as opposed to many other infectious diseases, large quantities of cold agglutinin frequently appear in the blood.

TEMPORAL RELATIONSHIPS

The cases of atypical pneumonia may now be considered in some detail. After a careful examination of the records, 37 were found in which the diagnosis was acceptable and the serum showed a definitely abnormal amount of cold agglutinin. Samples of blood representing different stages of disease in single cases were tested and depict the manner in which the level of cold agglutinins changes as the illness progresses. In fig. 3 the titres for all specimens are plotted, by scattering, against time. It will be seen that the titre remains within normal limits during the first week, usually rises rather precipitously soon thereafter, and reaches a peak at some time between the 10th and 20th day from onset of respiratory symptoms. Some degree of elevation may persist for an appreciable period, and the return to normal may not occur for a few months. Insofar as this aspect of its behaviour is concerned, the cold agglutinin in atypical pneumonia thus closely resembles the orthodox specific immune bodies.

The blood-group of 27 of these patients was determined and found to be distributed as follows: 17 group O; 7 group A; 2 group B; 1 group AB. Established statistical averages would lead us to anticipate nearly equal numbers of groups O and A; but in a series so small any deviation from expectancy is of doubtful significance.

Some of these patients were seriously ill, others were not. The period of hospitalisation varied from 10 days to more than 2 months. Without giving detailed case-

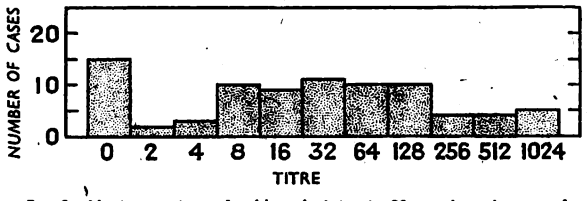

Fig. 2—Maximum titre of cold agglutinins in 83 unselected cases of atypical pneumonia.

histories, mention must be made of certain considerations in favour of the diagnosis of primary atypical pneumonia. Sputum from 24 of the 37 cases was injected intraperitoneally into mice. A pneumococcus was recovered 4 times; the specific type was not determined. In the remaining 20 no pathogenic organism could be demonstrated. The bacteriological findings are thus similar, to those described by Kneeland and Smetana [9] and Longcope [14] for atypical pneumonia. The leucocyte count was almost always within normal limits: in 3 extremely ill patients it reached 20,000 late in the disease. Of the 37 cases 15 showed involvement of the right upper lobe of the lung. Sulphonamide drugs were given in several instances but without benefit. It is worth noting that the development of cold agglutinin in high titre was not prevented by this form of therapy.

On the above findings, 34 of the 46 remaining examples of atypical pneumonia may be eliminated from further consideration because samples of serum were available only at very early stages of the disease, or, in a few instances, because clinical data were inadequate. There remain 12 cases in which the titre of cold agglutinin was found to be within normal limits in blood specimens taken on or after the 10th day from onset.

Of these 12 we believe 9 may well have had bacterial bronchopneumonia rather than primary atypical pneumonia. It is recognised, of course, that the differential diagnosis is often impossible. Our grounds for believing that these 9 cases, considered as a group, may have represented bacterial pneumonia, are that in every one pneumococci had been recovered from the sputum, and that the involvement of the lungs as shown by roentgenograms was always limited to one of the lower lobes. This latter fact cannot be offered as an argument for bacterial pneumonia but it does show that involvement of upper lobes—strong evidence for primary atypical pneumonia—was not seen. Moreover, from the point of view of clinical findings these cases might well have been called

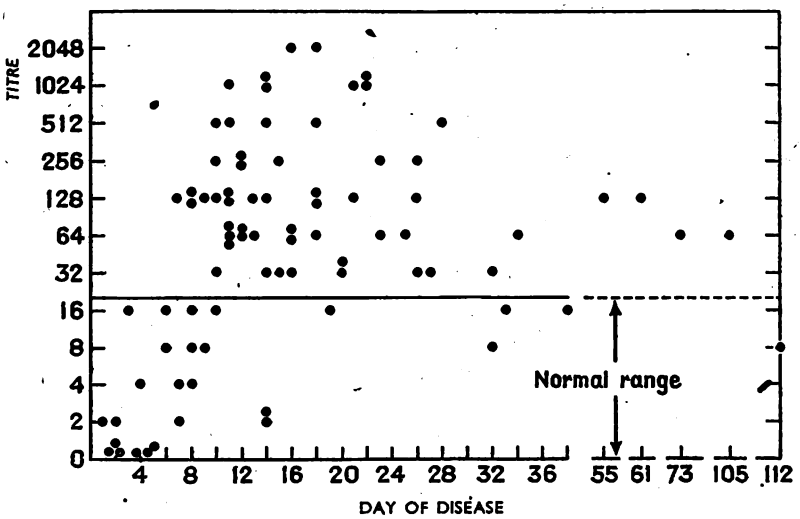

Fig. 3—Temporal development of cold agglutinins in 37 cases of atypical pneumonia.

† Serum samples kindly supplied by Miss K. C. Mills.
‡ Tested by Major C. H. Stuart-Harris, RAMC, for antibody to influenza virus

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"secondary bronchopneumonia" were it not for the tendency in recent years to call all bronchopneumonia in young adults "atypical."

Finally, there are 3 cases of pneumonia which was in all probability atypical who failed to develop cold agglutinins. Two samples of serum were examined in each. While this finding may be accepted as indubitable, it can be interpreted in several ways, and in view of the small number of observations its significance is difficult to assess.

PNEUMOCOCCUS PNEUMONIA

We had hoped to be able to show clearly the behaviour of cold agglutinins in classical pneumococcus lobar pneumonia. Up to the time of writing few examples of this disease have come under our observation. Moreover, owing to circumstances beyond our control, such as the exigencies of war and the excusable tendency on the part of physicians to administer sulphonamides at the earliest possible moment, difficulties have been encountered in the bacteriological examination of sputum. Ten cases of probable pneumococcus pneumonia, including 2 definite type I infections, have been studied carefully and we have not yet seen in any of these a significant rise in titre of cold agglutinin during the second or third week. A rigid demonstration of the validity of our belief that pneumococcus pneumonia thus differs serologically from primary atypical pneumonia must be left to time and to others more suitably situated to study the problem. Evidence for this idea is to some extent supplied by the recorded examples of pneumonia in which auto-agglutinins have interfered with the cross-matching of blood for transfusion. We have been able to find in the literature but 4 contributions on this subject, describing 6 cases.[2 5 18. 22] One is labelled "lobar pneumonia" but may be dismissed inasmuch as no clinical or bacteriological data are given.[2] Two can be classed definitely with current atypical pneumonia.[22] Clough and Richter's patient had prolonged "bronchopneumonia" and pneumococci were not found in the sputum.[5] Sherman's observations do not include sputum examinations, but one case he calls "influenzal pneumonia." The other surely bears no great resemblance to typical pneumococcus pneumonia, inasmuch as "both bases" were involved, a crisis did not occur, and the patient was ill enough at the end of the third week of disease to warrant transfusion.[18] On the other hand, it is notable that during the past 25 years or more many cases of pneumococcus lobar pneumonia must have received transfusions, yet no record of auto-agglutination occurring in association therewith has been uncovered.

OTHER RESPIRATORY INFECTIONS

Sera containing large amounts of antibody § to influenza "B" virus possessed normal titres of cold agglutinin. We could find no change in titre in chronic advanced pulmonary tuberculosis, or during convalescence from upper respiratory infections such as hæmolytic streptococcus sore-throat, sinusitis, and the common cold.

DISCUSSION

The data may be considered with regard both to immunological and clinical import.

In the first place, inasmuch as the cold agglutinins have been referred to as "non-specific" it might be thought that they represent merely some nondescript substances derived, perhaps, from necrosis of lung tissue. That this is not the case is shown by their failure to appear in advanced tuberculosis. Another possibility that might be entertained is drawn from Hughes's demonstration of a precipitinogen in the blood in the acute phase of yellow fever.[7] This material is found in the albumin fraction of serum. It is not virus, but rather forms in amounts directly proportional to the severity of illness. It behaves as an antigen in reacting with convalescent serum. But the situation obtaining in atypical pneumonia bears no resemblance. The titre of cold agglutinin would appear to be largely independent of the extent of involvement of pulmonary parenchyma and the intensity of the disease. We have recently seen a girl going about her routine work as usual with what she thought was only "an unusually bad cough." The titre of cold agglutinin was found to be 1:1000, though X-ray examination of the lungs disclosed no abnormality. Moreover, the agglutinin plays the part of antibody, not antigen, in the serological system.

Wiener, in his monograph on blood-groups, clearly indicates the lack of a sharp line separating non-specific cold agglutinins from specific antibodies.[23] Both may be absorbed by appropriate substrata. Clough and Richter showed that the cold agglutinin in their case was precipitated with the globulins of the serum, a finding likewise consistent with its being antibody.[5] That the substance is stable is attested by our finding high activity in a serum preserved for 9 months in the refrigerator. Furthermore, the present study indicates that in manner of development there is a striking similarity to specific immune substances.

In view of the high degree of specificity exhibited by most serological phenomena the probability that agglutination is here no exception to the rule must be recognised. From this standpoint two general hypotheses may be considered. The cold agglutinin in atypical pneumonia could be specific for an infectious agent. Inasmuch as the disorder is thought to be caused by virus, or a number of viruses,[20] one might suppose that the human erythrocyte is equipped with an antigenic component which closely resembles some element in the virus particle. This is to say that there might be a heterogenetic relation between red blood-cell and virus similar to that existing among the Forssman's antigens.[10a]

A second tentative explanation is prompted by a consideration of the relation of cold agglutinins to auto-antibodies. Mention was made earlier of the fact that so-called non-specific cold agglutinins, insofar as they affect the cells of the individual in whose serum they appear, may be termed auto-agglutinins. In atypical pneumonia, likewise, the cold agglutinin has shown a high degree of auto-agglutination. In this regard indeed the disease appears to fall into the serological class exemplified by paroxysmal hemoglobinuria and trypanosomiasis. It has been pointed out that the autoagglutinins of both of these conditions act most powerfully in the cold. Thus, in human serological systems there is this explicit reciprocal relation, to wit: cold agglutinins are likely to include an appreciable quantity of auto-agglutinin and, conversely, auto-agglutinins are largely "cold" agglutinins. In his discussion of organ specific antigens, Landsteiner states, in part, "The authors maintained that the antibodies effective in the Wassermann reactions are produced in consequence of an 'auto-immunisation' with components of pathologically altered tissues, aided, perhaps, by proteins of the spirochætes (Weil and Braun, Sachs). An analogous explana-

§ Tested for inhibitory effect on the Hirst chick-cell agglutination, by Major Stuart-Harris.

Legends to Illustrations on Plate

COLONEL DREW, MAJOR SAMUEL, CAPTAIN BALL

FIG. I (Case 1)—Small area of consolidation in left lower lobe on day after admission.

FIG. II (Case 4)—Wedge-shaped area of consolidation in left mid zone, three days after admission.

FIG. III—Same case 11 days later. Slight residual striation in affected area. Left hilar glands still moderately enlarged.

FIG. IV (Case 3)—Area of consolidation in right upper lobe extending to an enlarged right hilar shadow. (Day after admission.)

FIG. V—Same case 5 days later. Disappearance of the lesion. Residual mottling in right upper lobe.

FIG. VI—Same case after another week. Normal lung fields. Slight residual enlargement of hilar glands.

FIG. VII (Case 6)—Large area of consolidation in peripheral part of right lower lobe. Hilar glands on both sides are moderately enlarged. (Five days after onset.)

FIG. VIII (Case 7)—Opacity in right cardiophrenic angle. A reticular pattern is visible through this opacity. (Two days after admission.)

FIG. IX (Case 5)—Area of mottling in peripheral part of right upper lobe. (Two days after admission.)

FIG. X (Case 2)—Ground-glass appearance in right upper, middle and lower lobes. (Two days after admission.)

FIG. XI—Same case 6 days later. Partial loss of ground-glass appearance in right lung.

FIG. XII—Same case after another 5 days. Small area of consolidation in axillary part of right upper lobe adjoining the minor interlobar septum.

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tion may apply to the formation of auto-hemolysins for human blood in paroxysmal hemoglobinuria." [10b] One could apply this reasoning further, and hypothesise that cold agglutinins are formed in atypical pneumonia in response to an antigen released by the action of an infectious agent, or agents, upon some tissue, perhaps specifically a component of the respiratory tract. It is of some interest in this regard, that auto-agglutination occurs in mumps with orchitis. The organ-specific properties of antigens prepared from testis [12] suggest that again a complex antigenic stimulus involving both virus and tissue is concerned in the immune mechanism.

With regard to atypical pneumonia, no experimental data are at hand to support one of these conceptions rather than the other. Both serve to emphasise, however, that the cold agglutinins may enjoy a specificity which has been masked by the heterogenicity of their relationships. The degree of specificity could probably be expressed most easily in terms of range of activity upon the erythrocytes of the human genotypes and of various species of animals, but studies of this kind have not yet been carried out in comprehensive fashion. Our view is that the cold agglutinin in atypical pneumonia is related heterogenetically to some specific and fundamentally distinctive property of the infecting organisms; whether this quality is possessed by more than one agent is a matter for investigation.

The practical value of the measurement of cold agglutinins for the classification and diagnosis of pneumonia can be determined only after a much wider experience has been gained. Attempts must be made to correlate the serological change with roentgenological as well as bacteriological findings. In view of the mixed character of infections of the respiratory tract and the likelihood that secondary bacterial bronchopneumonia is often mistaken for atypical pneumonia, this task is not inconsiderable. Fortunately, the test for cold agglutinins is simple.

Whether the subject will prove of interest to the epidemiologist will depend not only upon the above considerations but upon the sensitivity of the reaction. We have already mentioned the occurrence of a high titre in a young woman in whom the diagnosis of acute bronchitis had been made because X-ray examination failed to disclose a lesion in the parenchyma of the lung. From a different point of view much interest attaches also to the account in 1918 [5] of a clinical and serological pattern not unlike that described for atypical pneumonia today. It suggests that the disease is not new, and may have occurred sporadically for many years before 1939, when it assumed epidemic proportions and thereupon achieved widespread recognition.

SUMMARY

In a variety of diseases measurements by titration have been made of cold agglutinins acting upon human erythrocytes of group O. High titres were found regularly in primary atypical pneumonia and the manner of their appearance is shown to be similar to that of specific antibody.

On the other hand, many other common infections of the respiratory tract have no evident influence on the titre of cold agglutinin.

The possible significance of this serological difference has been discussed and the idea is advanced that it is specifically related to the nature of the infectious agent concerned. Certain implications for clinical medicine are briefly noted.

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Legends to Illustrations on Plate

DR. BANKS, MAJOR McCARTNEY

FIG. III—Thrombotic necrosis and hæmorrhage involving whole of gland except three small healthy areas at extremities.

FIG. IV—Commencing hæmorrhage, almost confined to medulla in case of fulminating encephalitis. (× 160.)

FIG. V—Pure hæmorrhage in medulla and part of cortex in case A—fulminating encephalitis and adrenal hæmorrhage. (× 95.)

FIG. VI—Pure hæmorrhage destroying cortex and medulla in case A. From another part of the gland. (× 110.)

FIG. VII (Case 1)—Hæmorrhage and thrombotic necrosis in cortex (× 290.)

FIG. VIII (Case 2)—Thrombotic necrosis.

FIG. IX (Case B)—Thrombotic necrosis in acute meningo-encephalitis with adrenal lesions. (× 610.)

FIG. X (Case 8)—Gross œdema with focal inflammatory adrenalitis. (× 210.)

FIG. XI (Case 9)—Inflammatory focal adrenalitis in cortex in elderly subject. (× 82.)

DR. BRAILSFORD

FIG. III (Case 5)—(*a*) June 3. Typical osteoclastoma of lower end of radius. (*b*) June 29, 1942. After radiation. Apparent extension of tumour, with absorption of trabeculæ. (*c*) July 26. Further absorption of trabeculæ, with fracture of lateral wall of cavity. (*d*) Dec. 17. Progressing consolidation.

PULMONARY COMPLICATIONS OF THE COMMON COLD AND SINUSITIS

FINDINGS IN MASS RADIOGRAPHY

J. A. KENNEDY, M B LOND
FLIGHT LIEUTENANT RAFVR

THE published results of mass miniature radiography in the Royal Air Force relate only to pulmonary tuberculosis (Trail 1942, Trenchard 1943, Evans 1943). Among the many non-tuberculous abnormalities and pathological conditions discovered, the most striking have been transient pulmonary shadows, mostly confined to the lower zones, and associated in a high proportion of cases with the symptoms of a common cold. Such shadows have been variously attributed in the past to "pneumonitis," "aberrant pneumonia," and "atypical pneumonia" to mention only a few appellations.

The characteristic features of these pulmonary shadows are: (1) they are small, rarely occupying more than one zone of the lung field; (2) they are rarely accompanied by constitutional disturbance; and (3) they regress spontaneously within two weeks in the majority of cases.

This brief review covers 100 such cases discovered during routine radiographic examination. The patients were not radiographed because of any symptoms, but were examined after an abnormality had been detected on the miniature radiogram. All were followed up clinically and radiologically until the lung fields were clear or almost clear.

Clinically the outstanding feature of these limited pulmonary infections has been the statement by 74 of the 100 patients that they have, or have had recently, a "cold in the head." The cold has consisted in a stuffy nose or rhinorrhœa followed within a few days (1–4) by the onset of cough, usually accompanied by a small amount of mucoid sputum. Of the 26 remaining cases, 13 stated that they had cough and sputum of recent but unknown origin, 4 admitted a recent cold but denied cough and sputum, and 9 denied a cold, cough or sputum. The seasonal incidence of the shadows is shown in the figure.

The duration of symptoms before the radiographic examination was most often 7–14 days, which is interest-

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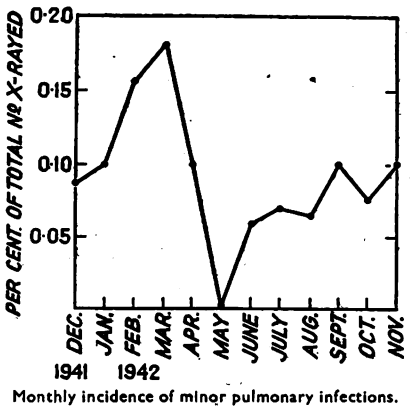
ing because this was the time that had elapsed since the patients were first congregated in the large recruiting centres. A few cases had symptoms dating back as long as 6 weeks, the usual history being that they had contracted a bad cold which had failed to clear. In general there did not seem to be any relation between the duration of symptoms and the type and extent of the pulmonary lesion. Pyrexia was found in only 11 cases. Several who ran a persistent temperature showed little clearance of the pulmonary lesion during three weeks, and all were reported as having infection of the nasal sinuses. Resolution of the pulmonary lesion in these cases was delayed, and began only after the acute stage of sinusitis was past. Occasional other symptoms were pain of pleural type, anorexia and lassitude. Lassitude seems to be a more common accompaniment of non-tuberculous infections than of tuberculosis. It has been most surprising in many cases to find a considerable area of lung involvement unaccompanied by any constitutional disturbance, although there were physical signs in the chest.

RADIOLOGICAL FINDINGS

In 49% of cases the lesions were on the right side; in 30% they were on the left, and in 21% they were bilateral. Within each lung field, the lower zones were more commonly affected than the middle or upper. An isolated mid-zone lesion is rare, especially on the left side, whilst upper-zone lesions were found in 2 cases only. It is noteworthy, however, that in both of these the radiological appearances were very similar to those of early tuberculous infiltration (Assmann's focus).



Monthly incidence of minor pulmonary infections.

The distribution of lesions is what one would expect from a descending infection; the right lower zone is infected more than others, probably because it is in the most direct line with the trachea. Lateral radiography indicates that the basal lesions are nearly always in the posterior and axillary basal branches of the lower-lobe bronchus. Middle-lobe lesions are uncommon.

The extent of the lesions seems to be maximal within 2 or 3 days of the appearance of the upper respiratory infection, and clearance is usually complete within 2 or 3 weeks. The few cases in which the lesions have extended have all been found to have continued nasal infection in the form of sinusitis. None have been encountered in which the lesions have resolved in one area to reappear in another—the so-called migratory pneumonia.

Radiologically the lesions have fallen into three main types:—

1. *Bronchopneumonia.*—The lesions in this group are ill-defined mottled shadows, varying in size from a small area of loss of translucency in the costophrenic angle to pseudo-lobar consolidation of the one or more segments of a lobe. Bronchopneumonic shadows are nearly always basal, and usually regress rapidly. The cases which had gross infection of the upper respiratory tract in the form of sinusitis always showed this type of lesion.

2. *Pneumonia.*—This term is applied to lesions characterised by a circumscribed area of faint loss of translucency——a ground-glass appearance. In no case was the loss of translucency as great as in the pneumococcal lobar pneumonia—the densest shadows in this series have been formed by the confluent bronchopneumonic type. These pneumonic shadows appear to have two sites of election—the right cardiophrenic angle and the left lower zone, appearing on the postero-anterior film as being partially overlapped by the left cardiac border.

3. *Basal striations.*—There seem to be two types of basal striation.

The first is seen as wide soft tubular shadows, sometimes with a clear central space, descending downwards and outwards from the lower pole of the hilum. They bifurcate only occasionally, and decrease but little in width after each bifurcation. They appear unlike vascular shadows and are, moreover, often accompanied by sibili and rhonchi: they are therefore called bronchitic shadows.

The second type of basal striation is much smaller, and more irregular in distribution, often presenting a network appearance. It is seen during the stages of resolution of the broncho-pneumonic and pneumonic types, occupying a rather larger area than that covered by the original lesion. If the original lesion has been extensive, the network commonly drains towards the hilum, the individual lines becoming more parallel as they approach the hilum, thus producing an enlarged hilar shadow. In most cases, however, the hilar shadow is not enlarged. This type of striation has been called the drainage type, and probably represents hyperæmia and lymphatic engorgement.

It is unusual to find any one of these types of shadow present in pure form. Basal striation is always present with both the bronchopneumonic and pneumonic types and persists for a short while after the resolution of the latter lesions. Further the bronchitic markings are commonly seen alone, especially on the side opposite to a bronchopneumonic lesion. In bilateral lesions, there may be a pneumonic type on one side and a broncho-pneumonic type on the other—in fact any combination of types may be seen.

DISCUSSION

The cause of these limited transient pulmonary lesions seems to lie in the upper respiratory tract. It is suggested that the descending infection may be arrested at any point in the bronchial tree, the actual site depending on the general and local defence mechanisms and the virulence of the organisms. Further the physical signs and radiological appearances depend upon the stage at which the infection is halted.

In many cases the invasion is checked at an early stage—i.e., in bronchi of the 2nd and 3rd order, here producing an acute localised bronchitis. In such cases the bronchi often become visible on the X-ray film as wide tubular shadows, already described under the term bronchitic shadows. It has been found that the physical signs most commonly accompanying such an appearance are sibili and rhonchi heard in early inspiration and indicating swelling and increased secretion of the bronchial mucosa. The bronchitic shadows persist for a short while after the disappearance of the physical signs.

Should the infection progress further, it will involve the smaller bronchi, bronchioles and alveoli, giving rise to a bronchopneumonia. The radiological signs have been given above, and are usually accompanied by moist râles and crepitations heard in mid and early inspiration. It is not uncommon to find some small degree of collapse in many bronchopneumonic areas, as evidenced by bunching of the bronchi; a return to normal takes place with resolution of the lesion. The middle lobe, however, is peculiar in that minor degrees of collapse often persist many weeks after the clearance of the initial lesions. The bronchopneumonic lesions associated with sinusitis are usually more extensive than those dependent upon a simple coryzal rhinitis; they tend to become confluent and occupy one or more segments of a lobe. When this is so, and when the segment is superficial, the percussion note may be diminished.

The pneumonic type, as characterised by the ground-glass areas of loss of translucency, is more doubtful of interpretation. It may represent a stage of low-grade alveolar infection or of deficient aeration resultant upon swelling of the mucosa of the smaller bronchi and bronchioles. Clinically such areas are often silent, as might be expected from their usual small size and origin. Occasionally however a few fine late inspiratory crepitations may be heard.

It is interesting to note that 4 cases of bronchiolitis obliterans have been brought to light by routine radiographic examination. The radiological appearances were those of multiple discrete millet-seed opacities scattered evenly throughout the lung fields. In one case however these appearances were confined to the left lower zone. The only discoverable cause in 3 of the 4 cases has been a recent cold, and it is possible that in these cases the descending infection has shown a

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predilection for the terminal bronchioles. Resolution is a lengthy process, although there has been considerable clearance, without resultant emphysema, within two months.

The fact that all types of lesions, except bronchiolitis obliterans, show spontaneous regression within 2 or 3 weeks is important in differentiating them from similar radiological appearances to be seen in tuberculosis, bronchiectasis, carcinoma of the bronchus, and lung abscess. True atypical pneumonia gives rise to greater constitutional symptoms; pyrexia is always present; and resolution is delayed for many weeks—although this criterion is not accepted by Drew (1943).

The importance of chronic infections of the upper respiratory tract in the production of bronchiectasis can be inferred from these findings, and it can be no accident that various investigators have reported a high incidence of sinus infection in cases of bronchiectasis.

SUMMARY

In 100 cases in which transient pulmonary shadows were detected by mass radiography the radiological appearances fall into three main groups—broncho-pneumonic, pneumonic and basal striations. The last group comprises "bronchitic" and "drainage" types.

Radiologically the lesions are small, and they nearly always regress spontaneously within 2 or 3 weeks. Clinically constitutional symptoms, apart from a cough and a small amount of mucoid sputum, are rare. Physical signs are usually present, but an X-ray film is needed to show the extent and type of the lesion.

The lesions are probably the result of infection descending from the upper respiratory tract.

I am indebted to Wing-Commander R. R. Trail and Squadron-Leader H. J. Trenchard for their helpful criticism and suggestions, and to Flight Lieutenent L. G. Scott for his careful case-records.

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MENINGOCOCCAL ADRENAL SYNDROMES AND LESIONS

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(Illustrations on Plate)

THE capillaries and perivascular tissue of the brain and cord can be invaded in certain fulminating and acute cases of meningococcal infection, producing capillary thrombosis, hæmorrhages, perivascular cuffing or even abscess. This form of meningococcal encephalomyelitis may be present concurrently with bilateral adrenal hæmorrhage (Banks and McCartney 1942). The combination is probably not uncommon in severe cases during an epidemic—it was present in 3 out of 9 fatal cases we described in 1942—but it has not hitherto been clearly recognised, although MacLagan and Cooke (1916) made clinical observations suggestive of this combination and Sacks (1937) drew attention to the cerebral lesions in one fatal case of adrenal hæmorrhage due to pneumococcal infection.

Gross adrenal hæmorrhage is, of course, easily recognised at autopsy, but the encephalitic lesion is just as easily overlooked. That it has in fact been overlooked is suggested by the published work on the now well-known meningococcal adrenal syndrome (fulminating septicæmia, massive purpura and bilateral adrenal hæmorrhage). The later clinical descriptions of this syndrome include not only signs of toxæmia and adrenal deficiency but also such signs as coma and rapid stertorous breathing, which in a clinical picture of acute meningococcal infection are very suggestive of encephalitis.

Evidence is submitted in this paper that the meningococcal adrenal syndrome as at present understood is not a single entity but is composite. It can be differentiated into a pure adrenal syndrome, in which the main organic lesion is confined to the suprarenals, and a mixed or encephalitic adrenal syndrome in which significant lesions are present in both the brain tissue and the suprarenals. The pure adrenal syndrome does not seem to be invariably fatal. With modern treatment a "recovery adrenal syndrome" is being developed, which is specific only in its evolution, happy termination and absence of direct pathological proof. Evidence is also submitted here as to the various adrenal lesions which may be present in meningococcal disease. They do not all consist of pure adrenal hæmorrhage. Thrombotic necrosis affecting the greater part of the glands is not uncommon. One case is described in which the main lesion appears to be a gross œdema of the gland accompanied by focal areas of inflammatory adrenalitis, and in another case composite lesions are described including hæmorrhage, thrombosis, œdema and focal adrenalitis.

Voelcker (1894), of the Middlesex Hospital, was the first to describe a case of fulminating illness associated with an extensive petechial eruption and double adrenal hæmorrhage. He was followed, among others, by Andrewes (1898), Garrod and Drysdale (1898), Batten (1898), Talbot (1900), and Blaker and Bailey (1901). In Batten's case the hæmorrhage was unilateral and right-sided. Dudgeon (1904) described 4 cases, one associated with *Staphylococcus aureus* and *albus* and one with pneumococcus cultured post mortem from the heart's blood, organisms which were not necessarily ætiological.

Graham-Little (1901) was the first to collect and classify the reported cases (11 young children) as a distinct clinical entity with a striking symptom-complex, sudden onset, vomiting, diarrhœa, restlessness, sudden appearance of purpuric eruption and death within 24 hours (coma not mentioned). At autopsy the only gross feature observed was bilateral adrenal hæmorrhage.

Andrewes (1906) described, in a man aged 53, the first case of meningococcal septicæmia in which the organism was demonstrated in blood-films. It was a fulminating case without meningitis, and with bilateral adrenal hæmorrhage. The clinical examination had shown an imperceptible pulse and a non-comatose though drowsy patient who could be roused up to a few minutes before death. Although Andrewes was primarily concerned with the demonstration of meningococcæmia by blood films, this case seems a good example of the pure meningococcal adrenal syndrome. Ten years, however, elapsed before the association of the meningococcus with bilateral adrenal hæmorrhage was definitely recognised (MacLagan and Cooke 1916). Waterhouse (1911) collected 14 cases, and described one in which rapid breathing and cyanosis were noted. He added nothing material to previous descriptions and shed no light on the ætiology. Friderichsen of Copenhagen (1918) described a case, mentioned cyanosis and semicoma and likewise added nothing to the ætiology. MacLagan and Cooke (1916), with experience of a considerable epidemic, distinguished two fulminating meningococcal types with adrenal hæmorrhage, one in which there was consciousness to the end and clear spinal fluid (probably the pure adrenal syndrome) and one in which there were meningeal signs followed later by general flaccidity, stertorous breathing, cyanosis and a turbid spinal fluid (a description which tallies with the encephalitic adrenal syndrome described in this paper).

According to Magnusson (1934), the first case described outside this country was by Borberg (1913), the first German case by Victor (1921) and the first American cases by Rabinowitz (1923), who was moreover the first to diagnose the condition during life and who drew attention to the activity of the thymolymphatic system. It was Thomas (1931) who named the condition "syndrom von Waterhouse" and Glanzmann (1933) who called it "Syndrom von Waterhouse-Friderichsen," a name which there seems no justification for retaining.

Excellent reviews of the syndrome were made by Magnusson (1934) who described a recovered case, Aegerter (1936), Sacks (1937) and Lindsay et al (1941). Recent short papers by Hughes (1940), Grace, Harrison and Davie (1940), MacKenzie (1941), Drummond and Tooke (1941), Monfort and Mehrling (1941) and Fox (1942) bring the total of reported cases to more than a hundred. The vast majority of these were meningococcal (probably 60%–70%) but the pneumococcus, staphylo-

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coccus, hæmolytic streptococcus, Pfeiffer's bacillus and *Neisseria flava* II are among the organisms incriminated.

The biochemical aspect seems to have been first mentioned by Baumann (1931) and by Magnusson (1934), who described hypoglycæmia of 27–39 mg. per 100 c.cm. and raised non-protein nitrogen (105–131 mg. per 100 c.cm.). Bamatter (1934) did not find a low blood-sugar. Carey (1940), in a recovered case, found Na,K, glucose and non-protein N within normal limits, but plasma bicarbonate was reduced.

The clinical syndrome was enlarged by Magnusson (1934), who described the striking cyanosis, sometimes amounting to an appearance like post-mortem lividity, which might vary for a time or even alternate with pallor. He also stressed as signs, unconsciousness, rapid shallow groaning respiration, often of Cheyne-Stokes type. Aegerter's description of the syndrome included stupor, semicoma or coma with rapid respirations and low blood-pressure. He was the first to suggest the use of adrenal cortical extract and adrenaline and sodium chloride in treatment. Sacks (1937) emphasised cyanosis, tachypnœa and mobile alæ nasi (often leading to an erroneous diagnosis of pneumonia); a toxic, often comatose child with rapid stertorous and terminal Cheyne-Stokes breathing; nuchal rigidity absent or only faintly present. He noted in a type I pneumococcal case that the brain showed scattered petechial hæmorrhages, "a hitherto unmentioned pathological finding ... which may be of significance as the background of the coma and convulsions often seen in these cases." Drummond and Tooke (1941) described a case in which perivascular hæmorrhages were found in the brain. Banks and McCartney (1942) described among 3 cases of fulminating meningococcal encephalitis in young children, one with gross bilateral adrenal hæmorrhage (there was another with commencing adrenal hæmorrhage), and among 3 cases of acute widespread encephalomeningitis one with adrenal hæmorrhage and extensive thrombotic necrosis.

Few recoveries from the syndrome have been claimed. Harries (1940) claimed recovery in 3 cases with imperceptible pulse. Carey's case (1940) is well documented. There was very low blood-pressure gradually rising under treatment with adrenal cortical extract, saline infusions and sulphanilamide. Meningitis was absent in the most acute phase but developed for a short time as the adrenal symptoms improved. The biochemical findings were inconclusive.

The following brief case-reports are examples of adrenal syndromes and lesions which have come under our observation.

The Pure Adrenal Syndrome

Clinical.—Sudden onset, fulminating septicæmia, petechial and blotchy purpuric rash, poor or imperceptible pulse, *very low blood-pressure*, greyish pallor, variable cyanosis, restlessness, vomiting and often diarrhœa, neck-rigidity slight or absent, otherwise general flaccidity, *mental condition clear to the end*, usually fatal within 24 hours but recovery possible.

Pathological.—Thrombotic necrosis with hæmorrhage, pure hæmorrhage and the lesions of unknown nature present in the recovered cases.

ADRENAL LESION: THROMBOTIC NECROSIS AND HÆMORRHAGE

CASE 1.—Female, aged 34 years, admitted July 12, 1941. Sudden onset shivering, vomiting and diarrhœa 8–10 hours and purpuric rash 6 hours before admission.

On admission, fully conscious, mentally alert, but restless, shocked, ill and feeling sick. Petechial and purpuric eruption general with some large purpuric blotches. Heart sounds faint; pulse imperceptible at wrist; blood-pressure 70/40 mm. Hg. No meningeal signs. Blood-culture: meningococcus group I. Spinal fluid clear and under very low pressure; contained 25 cells per c.mm., all mononuclears. Treatment on admission: 2 g. sulphathiazole i.v. and 2 g. by mouth 2 hours later: 10 c.cm. 'Eucortone' i.m.; normal saline by intravenous drip. Two hours after admission, hands, feet and legs cold and felt "dead"; pulse still imperceptible; BP 70/55 mm. Hg (faint sounds only). Five hours after admission vomited black-blood; died five minutes later. *She was fully conscious and able to converse to the end.*

Autopsy.—Numerous petechiæ in stomach, intestinal wall, pericardium and pleura; both adrenals plum-coloured, with structure of medulla and cortex obliterated; meninges and choroid plexus congested; no meningeal exudate. Sections of both adrenals exactly similar—a narrow zone of hæmorrhage around the periphery, and the bulk of medulla and cortex necrosed with nearly all the large vessels in the medulla thrombosed; necrosed cells mostly out of alignment and separated by hæmorrhage; palisade arrangement in cortex broken up (fig. VII on plate); much blood pigment; capsular vessels not thrombosed. Sections of cerebral cortex, midbrain and pons showed only congestion and œdema, with an occasional minute hæmorrhage.

CASE 2.—Female, aged 14 years, admitted St. Alfege's Hospital (care of Dr. Eli Davis) Feb. 26, 1942, at 10.20 PM. Catarrh for a week; absolutely well until morning of admission when woke with swollen legs and arms, headache and vomiting; rash came out in afternoon; slight sore throat; quite conscious but occasional mild delirium.

On admission, massive purpuric hæmorrhages 2–6 cm. wide covering face, trunk, limbs, buccal mucous membrane and conjunctiva; neck rigid; Kernig +; eyes normal; reflexes normal; no swelling of joints. T. 101° F.; P. 120 (very poor volume); R. 42 per min.; no chest signs. Spinal fluid pressure slightly increased; clear; few polymorphs; protein 95 mg. per 100 c.cm.; numerous meningococci (examined next day). Treatment: 3 g. sulphapyridine at once, 3 g. in 2 hours, then 1·5 g. 4 hourly. Pulse very poor all night: died 7.5 AM on 27th after 24 hours illness. *She was conscious to the end.*

Autopsy.—Massive hæmorrhages in skin and all mucous and serous membranes. One petechial hæmorrhage in cardiac muscle (2 c.cm. diam.). Brain and cord: meningitis; œdema. Massive hæmorrhage into both adrenals. *Sections.* Brain: cortex, internal capsule, midbrain, pons, medulla, cervical and lumbar cord show acute purulent meningitis and œdema of the nervous tissue; in internal capsule a large vessel and surrounding tributaries are packed with polymorphs, suggestive of bacterial embolus. Adrenals: extensive hæmorrhage involving whole of medulla and cortex except for a thin outer ring; the hæmorrhage encloses areas of necrosis throughout; islets of cortical cells pushed out of position by the hæmorrhage; hæmorrhage much more extensive than the necrosis; the large medullary vessels in some parts are thrombosed (fig. VIII). Skin: congestion and hæmorrhage in vessels below the epidermis and in the fatty subcutaneous tissue; no thrombosis seen.

CASE 3.—Male, aged 19 years, admitted Jan. 18, 1940. Sudden onset of nausea, vomiting and general pains about 16 hours before admission; then restlessness, delirium, general petechial and purpuric rash; some neck stiffness.

On admission, heart sounds faint and rapid. T. 99° F.; P. 118 per min., poor quality. Blood-culture grew anomalous group II meningococcus; gram-negative diplococci seen in

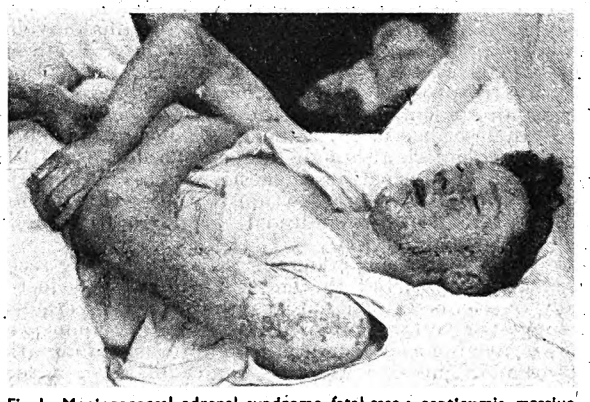

Fig. I—Meningococcal adrenal syndrome, fatal case: septicæmia, massive purpura, no meningitis, bilateral adrenal hæmorrhage and thrombotic necrosis. (Case 3.)

blood-films. Spinal fluid clear, under pressure; contained 1 white cell and numerous red cells in 1 c.mm. and grew two colonies meningococcus. White-cell count 12,900 per c.mm. (polymorphs 88·5%). Treatment: 2 g. sulphapyridine by mouth, 2 g. in 2 hours, then 1·5 g. 4-hourly. Eight hours after admission condition much worse: pulse rapid and feeble and sometimes imperceptible; well-marked dyspnœa of

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"air-hunger" type, sitting up for breath (no chest signs); very restless; rash much more confluent with purpuric areas 1–3 inches in diameter on face, arms and legs (fig. I); purpuric spots on mucous membranes, mouth, &c.; *not* incontinent. "Coffee-ground vomiting." Died 36 hours after onset; restless and tossing about, but *able to answer questions to the end.*

Autopsy.—Both adrenals intensely hæmorrhagic. Section showed massive thrombosis of nearly all the vessels and necrosis of the gland with rims of hæmorrhage at the periphery. There were only three (very small) healthy areas in the section, one at each extremity and one at the top of the central lobule (fig. III). The brain was not sectioned.

ADRENAL LESION; PURE HÆMORRHAGE

CASE 4.—Female, aged 3, admitted at 10 PM on May 5, 1941. Had refused food at 6 AM and vomited; listless and irritable all day but *conscious and rational until on her way to hospital;* rash on face and neck at 4 PM and purpuric areas all over body by 6 PM.

On admission, pulseless and moribund; profuse general purpuric rash with some elements ¼-inch in diameter; extensive areas of cyanosis of skin and mucous membranes; died in 3 minutes. Five minutes after death post-mortem lividity was well advanced on arms, legs and all over back; post-mortem rigidity well-marked within half an hour.

Autopsy.—Right heart greatly dilated. Spleen much enlarged, congested, firm. Suprarenals plum-coloured; most of medulla and large part of cortex destroyed. Brain under tension, greatly congested and œdematous; meningeal vessels engorged but no meningeal exudate except slight turbidity in the basal cisterns; choroid plexus congested; ventricles and fluid normal. Cord soft and diffluent; bulged on section. Cultures from cerebrospinal fluid of basal cisterns and ventricles sterile. Sections of brain and cord showed trace of leptomeningitis; congestion and œdema in all sections; no encephalitis or myelitis. Sections of adrenals showed severe hæmorrhage involving almost the whole medulla and much of cortex, especially the reticular zone; cortical cells necrosed and pushed out of alignment by the hæmorrhage; cortical vessels dilated; some areas of the cortex little affected; no thrombosis of medullary vessels.

(*Note.*—Meningococci were not actually demonstrated in this case: the child died within 3 minutes of admission.)

ADRENAL LESION ASSUMED (RECOVERY SYNDROME)

The following three cases which recovered are classified on the basis of their signs and symptoms as cases of the pure adrenal syndrome.

CASE 5.—Female, aged 7½ years, admitted June 17, 1942, at 9.30 PM. Sudden onset at midday, with vomiting, slight diarrhœa, increasing restlessness and drowsiness; headache at 4 PM; petechial rash at 7 PM.

On admission, greyish pallor, slight cyanosis; restless, irritable and drowsy but conscious of surroundings; very ill. Petechial and purpuric rash general, with a few purpuric blotches ½ inch in diameter (fig. II). Neck-rigidity slight, Kernig faintly positive, reflexes normal. T. 103·8° F. R. 38 per min.; pulse just perceptible; blood-pressure 86/50 mm. Hg, one hour later 64/40. Spinal fluid clear, pressure about normal, cells 92 per c.mm. (polymorphs 80%); protein 25, chlorides 710 mg. per 100 c.cm.; meningococci group I on culture. Treatment: 1 g. sulphathiazole sodium intravenously, then 1 g. four-hourly for 12 hours by mouth; glucose drinks, 10% glucose in normal saline rectally by continuous drip; 4 c.cm. 'Eucortone' intramuscularly.

June 18, 2 AM. Condition worse, pulse at wrist just felt (rate at apex 176 per min.), colour very poor, rash increasing, *very restless but conscious,* not taking well and rectal saline returned with loose stools; BP 56/?25 mm. Hg.; given 2 c.cm. eucortone i.v.; 10 g. glucose i.v. caused immediate improvement in pulse and colour and BP rose to 68/40. At 10 AM pallid and greyish, pulse almost imperceptible; BP, no sounds right arm, 62/40 left arm; rash not increased; rectal saline not retained; taken 15 oz. glucose and orange drinks. Eucortone 2 c.cm. i.v.; 10 g. glucose i.v.; 550 c.cm. N saline intraperitoneally; BP then improved to 70/40. Sulphathiazole 0·75 g. four-hourly by mouth and eucortone 5 c.cm. i.m. alternating four-hourly with desoxycorticosterone acetate ('Doca') in oil, 1 c.cm. (5 mg.) i.m. At 6 PM given 10 g. glucose i.v.; BP 80/60. Much quieter after intraperitoneal saline; taking drinks, speaking a few words. Spinal fluid now turbid and under pressure, cells 1150 per c.mm. (polymorphs 80%), no organisms; sulphathiazole content (free) 2·7 mg. per 100 c.cm. Very slight muscular rigidity. Fundi; right eye, slight but definite papilloedema; left eye, papilloedema just perceptible (Mr. M. Shaw). Passed two loose watery stools; vomited once. Blood-culture in *p*-aminobenzoic acid glucose broth sterile. Blood-sugar 190, blood-urea 80, cholesterol 150 mg. per 100 c.cm.; plasma bicarbonate 32 vols. per 100 vols. At 10 PM less restless but still drowsy; attacks of air hunger, taking great gulps of air through widely opened mouth. BP 78/55. Oxygen by nasal catheter, 'Somnifaine' min. 12.

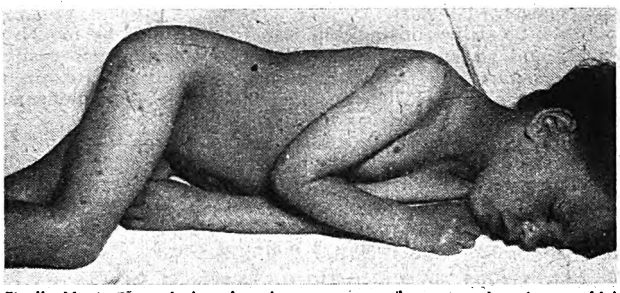

Fig. II—Meningococcal adrenal syndrome, recovered case: septicæmia, petechial and purpuric rash, commencing meningitis, very low blood-pressure. (Case 5.)

June 19. Definitely improved, pulse easily felt, BP 108/?. Rash still bright; T. 100° F.; no nuchal rigidity; resents disturbance; spinal fluid opalescent, 180 cells per c.mm., no organisms. No vomiting, taking well. Eucortone reduced to 3 c.cm. and doca to 2·5 mg. doses alternately four-hourly.

June 20. Improvement maintained. BP 94/50 and later 90/70. Blood-urea 46, blood sulphathiazole (free) 6·3, serum sodium 380 mg. per 100 c.cm.; plasma bicarbonate 46 vols. per 100 vols.

June 21. BP 104/70; rash fading; temp. normal; much improved; eucortone and doca discontinued. Further progress uneventful.

CASE 6.—Female, aged 5 years, admitted 3.30 PM on Oct. 10, 1941. Had vomited at 8 AM, restless and fretful; spots on body noted at 8.30 AM, increasingly ill and listless but quite conscious.

On admission, very ill, cold, listless, *answers questions intelligently;* pale with cyanosis; pulse very poor; BP 65/?; T. 100° F.; P. 130; R. 22. Profuse petechial rash general with some purpuric spots up to 3/8 inch in diameter; slight nuchal rigidity; Kernig positive (slight); reflexes normal. Spinal fluid opalescent, pressure slightly increased, cells 775 per c.mm.; abundant meningococci in films and culture. Treatment on admission: 2 g. sulphathiazole i.v. and 1·5 g. four-hourly by mouth for 12 hours; eucortone 2 c.cm. i.m. four-hourly; mist. alkalinæ four-hourly. At 10 PM pulse and colour slightly improved; patient warmer; restless and noisy; vomited twice (not after tablets).

Oct. 11. Slight improvement in pulse and colour; BP 80/55; occasional vomiting; eruption as before; taking well; sulphathiazole 1 g. four-hourly.

Oct. 12. Further improvement in pulse, colour and general condition; BP 80/60; rash fading; no nuchal rigidity. Sulphathiazole 0·75 g. four-hourly; eucortone discontinued.

Oct. 13. T. normal; pulse good; BP 90/60; rash faded; no vomiting; general condition much improved. Further progress uneventful.

CASE 7.—Female, a general hospital nurse, aged 26 years, admitted 3.15 PM on March 23, 1941. Had spent night of March 19–20 in public air-raid shelter. Sudden onset of headache, vomiting, general pains and slight sore throat at 10 PM on 22nd, followed rapidly by petechial rash on face, neck, trunk and limbs. Spinal fluid (2 hours after onset) clear; 4 cells per c.mm.; protein 50 mg. per 100 c.cm.; globulin nil; no organisms. Sulphapyridine had been given within 2 hours of onset; total 7 g. before admission.

On admission, pale, cold, collapsed, vomiting repeatedly; *quite rational and coöperative;* profuse purpuric rash with large slightly raised areas like mulberries. T. 97° F.; R. 22; pulse very poor, just perceptible; BP not recordable, no sounds at all. Neck-rigidity very slight; Kernig doubtful; reflexes normal. Spinal fluid opalescent, under very low pressure, cells 54 per c.mm.; no organisms. Treatment on admission: warmth by electric blanket; sulphathiazole 2 g. i.v., then 1 g. four-hourly i.v. or i.m. for 2½ days (oral route impracticable owing to repeated vomiting); eucortone 10 c.cm. i.m. six-hourly; 5% glucose in N saline by continuous intravenous drip (rectal saline having been returned). At 7 PM repeated

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vomiting; pulse just felt. BP 50/?. At 12 midnight still vomiting; restless; has absorbed 1500 c.cm. intravenous saline; pulse slightly improved; warmer.

March 24. Colour and pulse improved, but still extremely ill; purpuric rash very profuse and gross; frequent vomiting of small quantities clear fluid tinged with brownish blood. BP 80/? (faint sounds only); no neck-rigidity; complaint of "heartburn." At 6 PM frequent vomiting of small quantities persists. BP 80/?.

March 25 still vomiting, but now taking fluids by mouth; colour and pulse improved. BP 90/68 (sounds now easily heard); spinal fluid clear, normal pressure, cells 4 per c.mm.; protein 20, chlorides 700 mg. per 100 c.cm.; no organisms. Eucortone 5 c.cm. i.m. six-hourly.

March 26 vomiting less, taking sulphathiazole by mouth; less restless; pulse fair. BP 85/70. Rash fading; eucortone discontinued. Blood-pressure on 29th was 95/75 and on 30th was 110/90. Further progress uneventful.

(*Note.*—Meningococci were not isolated from this case: sulphapyridine given within 2 hours of onset.)

The Mixed or Encephalitic Adrenal Syndrome

Clinical.—Sudden onset, fulminating septicæmia, massive purpura, very low blood-pressure and collapse. In addition, *coma* and *rapid, stertorous or terminal Cheyne-Stokes breathing* (without abnormal chest signs). Neck-rigidity slight or absent, general muscular flaccidity, contracted pupils, cyanosis. (Striking contrast between the coma and stertorous breathing of this syndrome and the clear consciousness and normal or air-hunger type of breathing of the pure adrenal syndrome.) Some cases not fulminating but acute (cases B and 9), with signs of adrenal deficiency and encephalitis appearing 24 hours or more after onset. Encephalitis may be diffuse or focal (case 9). Meningitis always purulent in acute cases.

Pathological.—Encephalitis and hæmorrhage, thrombotic necrosis, gross œdema with ischæmia, focal adrenalitis or mixed lesions in adrenals.

Two cases of this syndrome were previously described (Banks and McCartney 1942, cases 3 and 7); these are summarised as cases A and B below; the remainder are new cases.

FULMINATING ENCEPHALITIS WITH MENINGITIS: BILATERAL ADRENAL HÆMORRHAGE

CASE A.—Male, aged 4 years. Pyrexia, purpuric rash, imperceptible pulse, coma, stertorous breathing, neck-rigidity and general flaccidity.

Autopsy.—Brain: diffuse capillary thrombosis with gross œdema. Adrenals: massive bilateral hæmorrhage, no thrombosis (figs. V and VI).

ACUTE MENINGO-ENCEPHALITIS: ADRENAL HÆMORRHAGE WITH MASSIVE THROMBOTIC NECROSIS

CASE B.—Male, aged 24 years. Pyrexia, meningitis, purpuric rash, stupor and rapid breathing on 2nd day of disease; pulse became uncountable on 3rd day; died 4th day.

Autopsy.—Brain: widespread capillary thrombosis and perivascular cuffing with fibrin deposition. Adrenals: hæmorrhage with massive thrombotic necrosis (fig. IX).

FULMINATING SEPTICÆMIA: VERY GROSS ŒDEMA OF BRAIN AND ADRENALS WITH FOCAL ADRENALITIS

CASE 8.—Male, aged 8 years, admitted at 8 PM on May 8, 1941. Sudden onset with headache and severe illness that morning, delirious all day.

On admission, desperately ill, greyish, cyanosed, sweating profusely, rapid grunting respiration (with no chest signs); pulse almost imperceptible and uncountable; *deeply comatose*, with no response to violent stimuli, but able to swallow. T. 101·4° F; P ?; R. 40. BP unrecordable, no sounds at all. Petechial rash on face, trunk and limbs with a few purpuric spots in front of axillæ. Slight neck-rigidity; general muscular flaccidity; contracted pupils; reflexes normal. Occasional convulsive twitchings of arms and legs. Spinal fluid clear, under pressure (30 c.cm. removed); contained 5 cells per c.mm.; no organisms. Blood-culture: meningococci group I. Treatment: 2 g. sulphathiazole i.v.; eucortone 5 c.cm. i.v.; fluids by mouth swallowed slowly. An hour later given N saline 750 c.cm. intraperitoneally. Convulsions became generalised, continued half an hour, with pupils dilated; coma then became absolute; died 10.30 PM, about 14 hours after onset.

Autopsy.—Petechial hæmorrhages in skin and peritoneum; dilatation of right heart; thymus enlarged (25 grammes); other organs congested; *suprarenals* showed no hæmorrhage but the medulla in both and part of cortex in the right had a peculiar *greyish gelatinous appearance.* Brain under tension, convolutions flattened, cut surface glistening; grey matter mauve-pink; no meningeal exudate; cord diffluent, cut surface bulged markedly. Sections of cerebral cortex, basal ganglia and pons showed very gross œdema with well-marked ischæmia and stained very poorly; a few small focal hæmorrhages in these sections. Medulla, cerebellum and cord: very gross œdema, comparatively bloodless and staining badly. Adrenals: great œdema of medulla and also of cortex; the section is thin, "full of holes" and stains very poorly, except for a single layer of cells staining well at the periphery; well-marked ischæmia; there are also numerous focal areas of polymorph infiltration (focal adrenalitis) but no hæmorrhage (fig. X).

(*Note.*—The œdema in this case appeared to be the key lesion, both in brain and adrenals, and was possibly due to the toxin damaging the capillary endothelium sufficiently to produce œdema but not hæmorrhage.)

FOCAL ENCEPHALITIS, PURULENT MENINGITIS, ADRENAL HÆMORRHAGE WITH THROMBOTIC NECROSIS AND FOCAL ADRENALITIS

CASE 9.—Female, aged 73 years, admitted at 9 PM on March 18, 1941. History of vomiting, shivering, headache and diarrhœa during past 24 hours.

On admission, drowsy, *semicomatose with deep rapid breathing*, and no definite chest signs; retention of urine. T. 98° F.; P. 116; R. 42; BP 120/80. Profuse purpuric rash on arms, thighs and buttocks, some spots being ½ inch in diameter. Slight neck-rigidity; tendon reflexes sluggish. Spinal fluid under pressure, cells 4000 per c.mm.; no organisms (examined next day). Treatment: 2 g. sulphathiazole i.v.; 0·5 g. 2 hours later, and then four-hourly; fluids by mouth. At 4 AM condition rapidly deteriorated, *coma became absolute and pulse almost imperceptible.* Died at 8.40 AM, about 12 hours after admission.

Autopsy.—Brain congested; slight purulent meningeal exudate, mostly in sulci; adrenals diffusely hæmorrhagic. Sections of pons and internal capsule; well-marked œdema, scanty capillary thrombosis with slight perivascular hæmorrhage and a few small focal hæmorrhages. Adrenals: scattered hæmorrhages, thrombosis of at least one large vessel in medulla, well-marked œdema, and poor staining all through; several areas of polymorphonuclear inflammatory infiltration (focal adrenalitis) (fig. XI).

Discussion

It has been generally recognised that presenting signs of meningococcal infection may be (*a*) nasopharyngeal (carriers or nasopharyngitis), (*b*) septicæmic (fulminating, acute and chronic), (*c*) meningeal, (*d*) adrenal or a mixture of some or all of these. To this list must now be added (*e*) encephalitic or encephalomyelitic signs, according to evidence which we submitted in a recent paper. This latter finding throws light on certain confusing cases in which adrenal signs are prominent but are combined with other signs, such as deep coma and rapid stertorous breathing which can now be recognised as encephalitic in origin. Evidence is here presented that adrenal lesions may occur independently of brain lesions or may coexist with them. It has accordingly been shown that, in epidemic times at least, there is a pure encephalitic syndrome, a pure adrenal syndrome, and a mixed encephalitic adrenal syndrome, any of which may of course also include nasopharyngitis, septicæmia and meningitis.

Nine new cases of suprarenal infection, along with two cases of encephalitis with adrenal lesions previously reported, are studied and grouped in this paper. From this study it appears that meningococcal adrenal disease occurs in two main clinical settings—one in which there is consciousness or even a clear mental state almost to the moment of death or to recovery, and one in which there is deep coma accompanied by rapid stertorous breathing. In the published work these two clinical types have not been clearly distinguished, although one or two writers have made some reference to them. The evidence presented here suggests that in the former clinical type the significant lesion is confined to the

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suprarenals, while in the latter both brain and suprarenals are involved.

Two distinctive clinicopathological syndromes with involvement of the adrenals are thus differentiated. The first is here described as the pure adrenal syndrome and the second as the mixed or encephalitic adrenal syndrome. It is realised that in some cases the differentiation may not be completely sharp. Both syndromes include the signs and symptoms of collapse due to acute adrenal failure. The mixed syndrome includes, in addition, such cerebral signs as deep coma and rapid stertorous breathing.

The main features common to both syndromes comprise: sudden onset, fulminating septicæmia, petechial and massive purpuric rash, cyanosis, greyish pallor, vomiting, often diarrhœa, dehydration and acidosis if not too rapidly fatal, rapid, thready or imperceptible pulse, *very low blood-pressure*, general muscular flaccidity, with or without slight neck-rigidity. Exceptionally, instead of a fulminating there may be an acute course with adrenal signs supervening 24 hours or more after onset (case B). Meningitis may be present in both syndromes or absent in the most rapidly fulminating cases. Cyanosis, in its most gross form resembling post-mortem lividity, is perhaps more characteristic of the pure adrenal syndrome but at least a dusky cyanosis is common to both types.

The main differentiating clinical features between the two syndromes are (1) the state of consciousness and (2) the type of breathing. Mental clarity and normal or "air-hunger" type of breathing with restlessness in the pure adrenal syndrome contrasts with coma and rapid, stertorous or irregular terminal breathing in the mixed syndrome. Other distinctive clinical signs which may be present in the mixed syndrome are convulsions, contracted pupils, incontinence of urine and fæces, papillœdema of more than one dioptre, and extensor plantar reflex. The striking difference in clinicopathological findings between cases 1 to 7 on the one hand and cases A, B, 8 and 9 on the other, suggest that a differentiation may be made on the above lines. In the recovered cases (5, 6 and 7) an assessment must be made purely on a clinical, bacteriological and biochemical basis. The most significant factors are fulminating septicæmia with recovery of the organism from blood or spinal fluid, massive purpura and very low blood-pressure. Biochemical findings are bound to be limited to a few isolated observations in such an acute disease. There is no time, for example, for an exact determination of the sodium and potassium balance. Hypoglycæmia, if present, is rapidly affected by the glucose used in treatment. Ketosis, diminished alkali reserve and raised blood-urea are likely to be present at the most critical stage of the illness, and a low serum sodium may or may not be found. In case 5 these were the biochemical findings. On the basis of the above observations, cases 5, 6 and 7 are submitted as probable examples of recovery from the pure adrenal syndrome. No case suggestive of recovery from the mixed syndrome has been met with.

Treatment must be immediate and vigorous from the moment the diagnosis is suspected. An immediate intravenous injection of sulphathiazole or sulphapyridine should be given, followed by high dosage of the drug either by mouth or by injection if there is much vomiting or deep coma. For the acute adrenal crisis the treatment comprises repeated intravenous glucose and saline; intravenous cortical extract and intramuscular desoxycorticosterone acetate or cortical extract alternately every 4 or 6 hours until the blood-pressure improves; warmth and stimulants as for shock. With early diagnosis and treatment on these lines, failure is not inevitable and there may even be a reasonable prospect of success.

The nature of the adrenal lesion requires further investigation. It is not always simple hæmorrhage; a variety of reactions both toxic and inflammatory are met with. Examples are given here of pure hæmorrhage, thrombotic necrosis with peripheral hæmorrhage, gross œdema without hæmorrhage but with areas of focal polymorph adrenalitis, and a mixture of these lesions—hæmorrhage, œdema, thrombosis and focal adrenalitis. A commencing lesion is seen in fig. IV, hæmorrhage being almost confined to the medulla but with a few small focal hæmorrhages in the cortex. This lesion produced no clinical symptoms of adrenal deficiency. The case was reported as fulminating encephalitis and meningitis (Banks and McCartney 1942, case 2). Figs. V and VI are two fields from a section showing pure and extensive hæmorrhage destroying most of the medulla and many cortical cells, other cortical cells being pushed out of alignment. Figs. III, VII, VIII and IX are all from different cases in which the sections show extensive thrombosis of the large medullary veins with massive necrosis of the adjacent parts of medulla and cortex. In such sections there is usually only a rim of hæmorrhage in the mid and outer zones of the cortex. In some cases showing this thrombotic necrosis the cortical cells are pushed out of alignment, in others they do not seem to be so. It is difficult to determine whether the hæmorrhage or the thrombotic necrosis is primary. The third pathological lesion illustrated is in fig. X—namely, very gross œdema with focal areas of inflammatory adrenalitis (case 8). The sections here are poorly staining and full of holes. They suggest a very intense and diffuse toxic action on the capillary endothelium combined with scattered foci of bacterial growth. The fourth lesion illustrated is a mixed one in an elderly subject (case 9, fig. XI), comprising œdema, some hæmorrhage, thrombosis of at least one large vessel, and scattered areas of inflammatory, focal adrenalitis. In this series the pure hæmorrhagic lesion occurred in young children and thrombotic necrosis occurred in the adults. Case 2, an adolescent, was of intermediate type.

Summary and Conclusions

Eleven cases of meningococcal adrenal disease are described, of which eight were fatal and proved at autopsy, and three recovered, the diagnosis being presumed. Meningococci were isolated from six of the fatal cases and from two of the recoveries.

In four of the fatal cases no significant organic lesion other than meningitis was found in the brain or cord, but in the remaining four there was evidence of diffuse or focal encephalomyelitis (capillary thrombosis, hæmorrhages and perivascular cuffing) or of very gross œdema.

Clinically, the former group and also the three recovered cases showed relatively clear consciousness maintained almost to the end, and normal rapid noiseless or acidotic breathing, while those with a cerebral lesion were deeply comatose and had rapid stertorous breathing.

It is suggested that in meningococcal (and possibly in other infective) disease involving the adrenals there are two distinct clinicopathological syndromes—(1) pure adrenal and (2) mixed or encephalitic adrenal.

Prompt diagnosis and immediate sulphonamide treatment of the infection with vigorous replacement therapy for the adrenal crisis may lead to recovery, at least from the pure adrenal syndrome.

The pathological lesions found in the adrenals comprised not only pure hæmorrhage but also thrombotic necrosis with hæmorrhage, gross œdema and focal inflammatory adrenalitis.

We have to thank Dr. A. B. Bratton, Dr. S. Robinson, and Dr. C. C. Bryson, of the Central Histological Laboratory, LCC, and Dr. E. N. Young, of the Southern Group Laboratory, LCC, for certain post-mortem work and sections of tissue; various members of the medical staff, past and present, of Park Hospital for valuable clinical help; and Dr. B. A. Young, medical superintendent, and Dr. E. Davis, resident physician, St. Alfege's Hospital, LCC, for permission to quote case 2 which was treated in that hospital. The photographs were produced at the Southern Group Laboratory, Park Hospital.

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TREATMENT OF OSTEOCLASTOMA

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RADIOLOGIST TO THE ROYAL CRIPPLES AND QUEEN ELIZABETH HOSPITALS, BIRMINGHAM

(*Illustrations on Plate*)

OSTEOCLASTOMA, or, as it was formerly called, myeloma, myeloid sarcoma, giant-celled tumour or sarcoma, is a tumour in which the histological preparation shows a striking number of multinucleated giant cells. Though many of these tumours exhibit local malignancy only, a certain proportion of them, which present clinical, histological and radiographic features indistinguishable from the others, produce metastases, usually in the lungs. The exact relation of this tumour to trauma and its resultant subperiosteal or medullary hæmorrhage is unknown, but the patient usually gives a history of an injury to the site beneath which the tumour has developed. It may be found in any bone, but the most common sites are the juxta-epiphyseal areas at the lower end of the femur (particularly the lateral aspect), radius and tibia, and at the upper end of the tibia and fibula. In these sites the radiographic appearances, which I described, illustrated and discussed with the differential diagnosis in a former paper,[1] are usually characteristic and rarely give the experienced radiologist any difficulty in recognition, but in the less frequent sites such as the vertebræ, the scapula, the pelvis or the bones of the hands and feet, the diagnosis may not be established even after the tumour tissue is examined histologically. From a study of the histories of the following cases suggestions are made respecting treatment.

CASE-RECORDS

CASE 1.—A woman, aged 23, late in December, 1939, complained of pain in the region of her right knee which was swollen. It became more painful after she knocked it a week or so later. On Feb. 14, 1940, she was sent to me for X-ray examination. She then had a hard swelling on the lateral aspect of the upper end of the tibia which was somewhat tender to pressure, but the movements of the knee-joint were not impaired. I reported that the radiogram (fig. I) showed a typical osteoclastoma of the lateral half of the head of the tibia. The swelling markedly increased during the next week and the movements of the knee-joint became restricted. The tibial head was explored on Feb. 27 and a very vascular tumour about 3 in. in diameter was curetted from the bony cavity, the walls of which were afterwards carbolised. Material from the tumour submitted for histological examination showed the typical features of an osteoclastoma and was reported on as such. For the next 6 weeks it was kept immobilised in plaster, when this was removed. On May 8 a radiogram of the tibia showed further invasion by the tumour and a radiogram of the chest showed no evidence of secondaries. The limb was amputated through the thigh and she appeared to make a good recovery, but towards the middle of August, 1942, she began to complain of shortness of breath. A radiogram on Sept. 7 (fig. II) revealed a large rounded tumour filling the upper 2/3rds of the left chest.

1. *Brit. J. Radiol.* 1937, **10**, 171.

CASE 2.—A woman aged 29. In 1918 she complained of swelling of the upper end of the tibia. Radiograms showed the typical appearances of osteoclastoma of the head of the tibia. Localised curetting of the tumour was carried out. The tumour seemed to remain quiescent until 1930, when further swelling occurred and radiograms showed well-marked expansion of the head of the tibia with coarse and somewhat blurred trabeculation which appeared to be breaking down. Amputation through the middle third of the thigh was performed. In 1933 the patient complained of shortness of breath and a radiogram showed a large rounded tumour in the left lung from which she died a few weeks later.

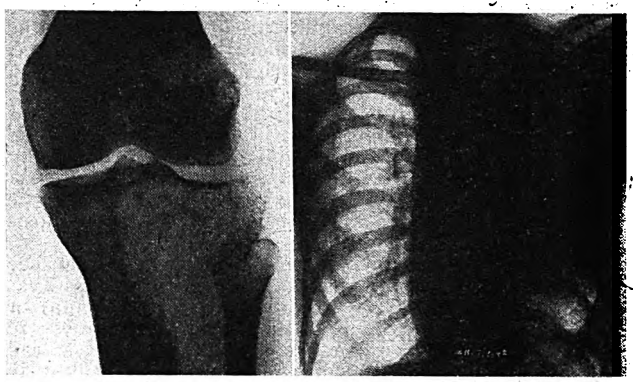

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Fig. I—Case 1. Feb. 14, 1940. Characteristic appearances of osteoclastoma of outer two-thirds of tibial head.
Fig. II—Case 1. Sept. 7, 1942. Large rounded opacity filling upper two-thirds of left lung field.

CASE 3.—A man, aged 24, complained of swelling of the lateral aspect of the lower end of the femur in August, 1920, when a radiogram showed a typical osteoclastoma. This was treated by local curettage and carbolisation of the cavity. The patient was apparently well until September, 1935, when he complained of a painful swelling in the same area. X ray on Sept. 19, 1935, showed an apparent recurrence of the tumour, and this was excavated on Nov. 31, 1935. The histologist's report was chondrosarcoma. The pain persisted, and the limb was amputated on June 4, 1936. On June 12 a small secondary tumour was detected in the lower left lobe of the lung. The patient died in December, 1936.

CASE 4.—A man, aged 21, complained of swelling in the region of the ankle-joint which seemed to follow a kick while playing football in May, 1932. A radiogram on Dec. 1, 1932, showed a typical osteoclastoma of the lower end of the tibia. Deep X-ray therapy was given in December and January, 1932. Two months later the swelling had considerably increased; a radiogram showed that the subperiosteal border and the coarse trabeculæ which could be seen throughout the tumour area on the radiograms taken before therapy had been completely absorbed and the bone now appeared to have been more extensively invaded. The surgeon regarded this as evidence of increased activity in the tumour, the growth of which had apparently been stimulated by X radiation. Amputation was performed in March, 1933. The histological report on the tumour tissue read: "Nothing suggestive of an ordinary giant-cell tumour was seen. A few osteoclasts are scattered through the section but the tumour is mostly composed of degenerate cartilage with some cellular areas which are well preserved. It has the characters of a degenerate chondrosarcoma." There has since been no recurrence.

CASE 5.—A man, aged 28, complained of painful swelling at the wrist. A radiogram on June 3, 1942, showed a typical osteoclastoma of the lower end of the radius (fig. III a on plate). In reporting this I advised X-radiation therapy without preliminary biopsy and warned the surgeon as a result of the radiation to expect an apparent extension of the tumour. A radiogram on June 29 after radiation did show an apparent extension of the tumour (fig. III b); the bone trabeculæ throughout the tumour and its medial walls were being absorbed. The wrist was more swollen and the skin exhibited a well-marked erythema. In the radiogram taken on July 26 (fig. III c) all the internal trabeculæ had been absorbed as well

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as the medial and articular bony walls of the tumour; the thinned lateral bony wall had fractured. The clinical appearances of the wrist now suggested a considerable advance in the growth of the tumour, and any surgeon who was unaware that in spite of this consolidation would follow might well have urged immediate amputation. Monthly radiograms showed a gradual reappearance of calcium and definition of the bony outline indicating progressive consolidation. The one taken on Dec. 17 (fig. III d) shows the progress of the consolidation. There had been some collapse of the lower third of the radius as a result of the fracture. This might have been avoided if the limb had been immobilised until radiograms indicated consolidation. By May, 1943, he had good function and strength—the clinical and radiographic improvement had continued.

DISCUSSION

The first three cases demonstrate clearly that a certain number of osteoclastomas cannot be eradicated by drastic curettage of the bony cavity and carbolisation of the walls, and that subsequent amputation does not prevent the development of lung metastases. Operation solely for biopsy can serve no useful purpose. The tumour material was radically removed in all cases and submitted for histological examination. It showed the typical features of osteoclastoma and merely confirmed the radiological report. Yet amputation was performed in all and failed to prevent the spread.

Cases 4 and 5 illustrate the value of X-radiation therapy. The radiographic appearances were typical; there was no call for biopsy and none was performed. The patient was submitted to deep X-ray therapy which produced radiographic appearances which are liable to be misinterpreted by those who have not experienced it—an apparent stimulation of the growth of the tumour. Herendeen [2] pointed out the fallacy of these appearances as long ago as 1924.

All who have to treat these tumours must realise that X-radiation therapy results in an extension of the osteolytic absorption of the involved bone. All the bony trabeculæ of the tumour area may be wiped out; the cortical and subarticular bony capsule may appear to have been completely destroyed and the adjacent bony walls still further invaded. Such is the change which may be seen in radiograms taken during the first two months after X radiation. In addition the clinical appearances during this period may indicate a progressive expansion—the area is more swollen and the skin reddened, and in some cases fracture of the weakened bony wall takes place. It is advisable for the radiologist to warn the surgeon of this sequence of changes. With patient treatment during the succeeding months the tumour area reossifies and ultimately the area consolidates and often assumes a density greater than that of the normal bone. As is indicated by the histology of the tumour removed in case 4 the X radiation destroyed the characteristic cells of the tumour; no metastases developed after amputation in this case.

CONCLUSIONS

The treatment of choice for osteoclastoma whatever the site is X radiation.

If amputation is regarded as essential it should be preceded by X-ray therapy and consolidation awaited.

The diagnosis can be established by radiography, and biopsy is neither necessary nor desirable.

2. Herendeen, R. E. *Amer. J. Surg.* 1930, 8, 122.

Medical Societies

ROYAL SOCIETY OF MEDICINE

AT a meeting of the section of proctology on June 9, with Mr. E. T. C. MILLIGAN, the president, in the chair, visitors from the sections of medicine and psychiatry opened a discussion on

Functional Diseases of the Rectum

Sir ARTHUR HURST reviewed the physiology of the colon, rectum and anal canal, reminding the meeting that the colon and rectum, though insensitive to tactile, thermal and painful stimuli, respond to tension in their walls. The anus and anal canal, however, are sensitive to all ordinary stimuli. Tension in the rectum is associated with the desire to defæcate. The infant placed on a chamber in the morning begins to acquire a conditioned reflex which starts peristalsis along the colon; the entry of fæces into the rectum then leads to a simple reflex contraction of the whole rectum accompanied by relaxation of the anal sphincter. Most functional disorders of the pelvic colon and rectum depend, Sir Arthur considers, on interference with this normal sequence. If a call is not acted upon, the rectum relaxes. He finds that over half of cases of constipation are due to interference with the reflex or to inadequate defæcation. Most people who think they are constipated really have liquid stools as a result of purgatives; and half of these, if told to stop all aperients, will pass a normal stool. Sir Arthur regretted the revival of establishments for colonic lavage —"colonic laundries," the Americans call them—where the large bowel is assaulted with as much as 30 pints of water, a pint at a time. After the last 10 pints the offended colon naturally produces large quantities of mucus—a response to irritation which would then be reported as abnormal. Mucous colitis, he said, though much less common than it used to be, always arises as a result of a wrong idea that mucus is abnormal after an aperient or a washout. Nervous women used to pass enormous mucous casts, associated with irregular colonic spasm, comparable with the spasm of asthma. He considers that 90% of cases of colonic spasm are secondary either to misuse of aperients or to carbohydrate dyspepsia. It is useless to attempt to diagnose the spasm by X rays because in any case a barium enema makes the colon contract. He treats such cases by reassurance and simple psychotherapy. People with a colon obsession should be made to realise that it does not matter whether they get their bowels open on any given day.

In 1917 McLellan described paroxysmal proctalgia, or rectal crisis of non-tabetic origin; in 1935 Thaysen [1] described the same thing, calling it proctalgia fugax. The patient has attacks of severe rectal pain at intervals, usually at night and sometimes after sexual activity; it lasts about 10 minutes, leaving him well but exhausted. Sir Arthur thought it might be due to extreme spasm at junction of pelvic colon and rectum, associated with anæmia of the neighbouring bowel-wall like that seen in lead colic. Ryle found that some of these patients got relief by inflating the rectum with an enema syringe; others responded to inhalation of amyl nitrite, or chloroform supplied in 3-minim capsules.

Dr. HENRY WILSON recalled to the meeting that the pain of fissure or piles leads to disorder of bowel mechanism through fear; and emphasised that such lesions must be excluded before functional disorder is diagnosed. He distinguished between the jolly happy-go-lucky patient who never thinks of his bowels and the gauche self-conscious type with few outside interests. Bowel symptoms are much more likely to mean organic disease in the first type than the second. If a patient with functional symptoms is asked "How do you think your symptom is caused?" he will often reveal what his illness prevents him doing and what it gets others to do for him. Pruritus ani may be a physical expression of suppressed emotional irritation. He discussed the management of a case during investigation of symptoms. Specimens should be taken while the patient is in bed in hospital. He might be shown a model of the bowels and have their action explained to him—once. When all examinations are over he can be given advice on his private life.

Dr. GEOFFREY EVANS agreed that the anal margin and canal must be structurally intact if bowel action is to be normal. The practice of medicine, he said, is changing; nowadays it is a conspiracy between the doctor and the patient against the disease. To further this end he gives his patients a little pamphlet explaining how their bowels work. The surgeons must rehabilitate their patients' bowels after operation, and the target to aim at is "evacuation of a solid stool with a sense of completion"—a phrase he fears he may have used once too often since it appeared in THE LANCET'S peripatetic column. He believes perfection of function to be as important as regularity. Incomplete evacuation which leaves in the rectum a piece of fæces as big as a walnut or even a pea will give rise, he thinks, to those symptoms

1. See *Lancet*, 1935, ii, 243.

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of which patients who believe they are constipated complain; and the injection of 6–8 oz. of water at bedtime will get rid of the irritating walnut.

Passing over fatigue, food, vitamins, rushing in the morning, and psychogenesis as causes of bowel disorder too important to mention in the time at his disposal, Dr. Evans remarked that just as some people had funny noses some had funny sigmoids—a neuromuscular defect which might be inherited, in his experience, at any rate up to three generations. He asked whether there was also a neurosecretory disorder—a dry sigmoid. He had seen cases with inspissated fæces clinging quite tightly to the dry walls of the gut; and he thought some cases of ulcerative colitis might arise from the irritation caused by such particles. He suggested that cases of this type might benefit by washouts.

Dr. E. H. LARKIN said that the chronically costive patient, and the patient who fancies that he smells, both come to the doctor because an unformulated unconscious anxiety lies behind the symptom. He thought it a fair generalisation to say that any patient who gets as far as a proctologist on account of constipation is neurotic. A somatic conversion symptom may follow chronic fear; a patient who has a bomb dropped beside him every night for fourteen nights may develop colonic spasm; later he gets the spasm half an hour after the sirens go whether there are bombs or not; and since this is probably a couple of hours after his evening meal he may go to the doctor complaining of abdominal pain two hours after food—and he may even have a demonstrable colitis. In many people, he said, the emotions fly to the bowels, and thus if they get a neurosis it is a bowel neurosis. A patient of this type is likely to be obsessional, meticulous, and—if intelligent—witty and sardonic; or he may have overcompensated his sarcastic bent and be kindly or religious; he is usually superstitious. Dr. Larkin believes it best to humour him in his ritual and obsessions, for they are long established, and it is a mistake to deflate a frightened patient. When the psychiatrist has got all the facts he must explain psychosomatic relations to the patient, and get him to accept the psychogenesis of his symptoms. The treatment of depression brought on by anxiety includes rest, sedatives, reassurance and distraction.

Mr. LAWRENCE ABEL had observed a relation between siren diarrhœa and piles.—Mr. MICHAEL SMYTH mentioned two cases of megacolon in which the bowel acted only once every fortnight or three weeks. Presacral sympathectomy, he said, has given good results in this condition, which he distinguished from Hirschsprung's disease.—Dr. W. E. COOKE noted that in the tropics a cap of mucus on a solid stool was often a sign of bilharziasis.

Mr. A. DICKSON WRIGHT felt that he now knew what to do with his cases of functional colonic disorders: he would send them to a psycho-analyst, and thankfully. For the surgeon a woman with pain in the perineum is one to be avoided, he said, and so is the woman—it is nearly always a woman—who thinks she smells. He had cured one such, however, with lavender-water enemas.

Dr. F. PARKES WEBER pointed out that paroxysmal proctalgia was only one of the varieties of unstriped muscular spasm, and probably the least troublesome. He thought in some cases it might be secondary to prostatic enlargement.—Dr. S. K. WESTMAN drew attention to the resemblance between the colon, rectum and reproductive organs in regard to spasm, noting an analogy with dysmenorrhœa. He felt that research in psychology and endocrinology would produce better results in the long run than the section of nerves.

Sir ARTHUR HURST in replying said that when a woman complains that she smells, her husband is nearly always the only person who can detect the odour; he generally has something against his wife and he is the one who needs treating. Sir Arthur agreed that cases of dry colon existed and thought it justifiable to treat them with small doses of paraffin.

Reviews of Books

Roentgen Treatment of Diseases of the Nervous System

CORNELIUS G. DYKE, MD, FACR, associate professor of radiology, Columbia University; director, department of radiology, Neurological Institute of New York; LEO M. DAVIDOFF, MD, FACS, chief, department of surgery, and attending neurological surgeon, Jewish Hospital of Brooklyn. (Kimpton. Pp. 198. 15*s*.)

THE distinguished contributions of these authors in the field of X-ray diagnosis of neurological conditions are well known. They now present the results of their experience with X-ray treatment, together with an excellent summary of published work on the subject and the views of other workers in America. Claims of success in the treatment of many neurological conditions have been made in the past, especially by Continental workers, and have turned out to be ill founded. This book is the more welcome in that it provides a critical review of past claims as well as a large amount of new material. There is enough evidence here to make it a valuable work of reference in the decision as to whether or no a case is likely to benefit from radiation therapy. Many of the results are recorded in the form of charts, and the discussion of each condition is concise. The conclusions agree well with the findings of workers in this country, though some may feel that there is more evidence than these authors admit of the effect of X-ray treatment in retarding the course of syringomyelia, and that in some cases of pituitary basophilism results may be very good indeed. The neurologist, neurosurgeon and radiotherapist will all find much to interest them.

Biochemistry for Medical Students

(3rd ed.) W. V. THORPE, MA Camb., Ph D Lond. (Churchill. Pp. 476. 16*s*.)

THE third edition is welcome to those charged with teaching this subject. Though Dr. Thorpe says the new volume is not as up to date as he would have liked, it takes the reader a long way further on than the second edition. Descriptions throughout are accurate, concise and contemporary. A new chapter on the chemistry of respiration is good but might have given place to a chapter on the use of isotopes in biochemistry; respiration is well covered in many current textbooks of physiology. Here and there Dr. Thorpe seems a little too discursive for medical students. Thus he almost gives the impression that synthetic substitutes for insulin are more or less round the corner since 'Synthalin' has a "somewhat similar action" and its only disadvantage is its toxicity. This of course is misleading: the substance cannot be regarded even as a pointer in the direction of synthetic substitutes for insulin. Again on page 330 it seems a pity to call attention to the œstrogenic activity of vitamin D and yet leave out any reference to the highly active synthetic œstrogens which are at present widely used in therapeutics. These are minor points, but in a book likely to be a standard work for students the author must be more than ordinarily careful not to presuppose a critical faculty in his readers.

First Aid: Surgical and Medical

WARREN H. COLE, MD, FACS, professor of surgery, University of Illinois; CHARLES B. PUESTOW, MD, FACS, associate professor of surgery in the university. (Appleton. Pp. 351. 16*s*.)

THIS volume, being designed primarily for medical students, attacks first-aid from a new angle. War apart, the authors see reasons why medical students should be familiar with the principles of first-aid treatment; but a wider audience has also been kept in mind and scientific and medical terms are explained, so that anyone with elementary biological knowledge can understand the text. War has a dominating influence on the choice of the material, but the emergencies of civil life are also fully covered. Seventeen of the authors' colleagues at the University of Illinois have contributed to various sections so that authoritative surgical opinion has been obtained. The teaching throughout agrees with standard opinion in this country and is clearly and succinctly set out. The illustrations deserve particular praise, and the book could be studied with profit by those teaching first-aid as well as first-aid personnel anxious to extend their knowledge.

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THE LANCET

LONDON: SATURDAY, JUNE 19, 1943

PRIMARY ATYPICAL PNEUMONIA

SINCE the war began there have been sporadic cases and small outbreaks here and in North America of the acute infectious pulmonary disease which it is now fashionable to call primary atypical pneumonia. Under several names—usually some variant of "pneumonitis"—the condition has been repeatedly described during the last ten years. The clinical picture is ill-defined, but there is agreement about the signs and symptoms. The onset is, as a rule, gradual and this has made difficult any accurate estimate of the incubation period; it seems to vary from 7 to 21 days. The main presenting symptoms are a dry and paroxysmal cough, with fever, headache, malaise and chills. Physical signs in the chest, particularly in the early stages, are few, and were it not for radiological evidence the pulmonary involvement would often remain undetected.[1] Even then most investigators, including DREW, SAMUEL and BALL in this issue, comment on the absence of characteristic radiological appearances. The shadows given by the affected areas are less dense than those seen in pneumococcal pneumonia, they are rarely lobar in extent, and the cardiophrenic angles and lower lobes are the common sites of consolidation. Unfortunately some of the radiological pictures found also occur in other conditions. For instance, the woolly mottling illustrated by DREW and his colleagues (fig. IX), when seen in the upper lobes, may simulate tuberculosis, and difficulty may arise with lung abscess in an upper lobe, or with pneumococcal pneumonia inadequately treated with sulphonamides. Still more confusing is the finding of very similar radiological shadows in the course of mass miniature radiography in the Royal Air Force now reported by KENNEDY on another page. He describes 100 such cases. The pulmonary shadows were small and regressed spontaneously in 2 or 3 weeks; they were associated in a high proportion of cases with symptoms of the common cold. How is one to interpret the findings? Are these mild or inapparent cases of atypical pneumonia? Obviously no answer will be possible until we know the ætiology of atypical pneumonia.

The observation made independently by TURNER,[2] and by PETERSON, HAM and FINLAND,[3] that cold agglutinins in high titre are developed in atypical pneumonia, might help in differential diagnosis, since only in one other infectious disease, trypanosomiasis, is there any prospect of finding regularly these curious agglutinins which act at low temperatures and are inert at blood-heat. TURNER and his colleagues now confirm that cold agglutinins for human red blood corpuscles of group O are found regularly in high titre in atypical pneumonia but are not developed in many other common infections of the respiratory tract; alone amongst the controls, mumps complicated with orchitis gave positive findings. This reaction, whatever its explanation, may prove valuable in diagnosis and epidemiological surveys, but cannot replace exact knowledge of the causation of atypical pneumonia.

There are several reasons for assuming a virus ætiology. The ordinary laboratory investigations do not suggest a bacterial cause. No predominant bacterium is found in the sputum, and the total and differential white-cell counts in the early stages show either no abnormality or a leucopenia. The lack of response to sulphonamide therapy, which has almost assumed diagnostic significance, also favours a virus ætiology. Furthermore, certain viruses such as psittacosis, influenza and the virus of WEIR and HORSFALL,[4] and some species of rickettsia, which after all are virus-like in nature, are known to produce an atypical pneumonia. To this list the virus of lymphocytic choriomeningitis should probably be added, since SMADEL and others[5] have reported bronchopneumonia in two fatal infections with this virus. What evidence have we of the part played by any of these agents in the current outbreaks of atypical pneumonia? It is established that in the United States a percentage of cases of atypical pneumonia, indistinguishable from others on clinical grounds, are caused by psittacosis virus, and in all probability the same is true of this country. EATON, BECK and PEARSON[6] have isolated a virus of the psittacosis group from 4 of 6 cases in a small outbreak of what was termed atypical pneumonia, and have shown that psittacosis antibody was developed in 3 of them. Since 3 of the patients died one might argue that this was not atypical pneumonia, which is as a rule relatively benign. SMADEL[7] investigated 45 sporadic cases of clinical atypical pneumonia occurring in urban populations in the USA and demonstrated a rising titre for psittacosis antigen by the complement-fixation test in 9; from 2 of these 9 patients psittacosis virus was isolated, and one died. There is also serological evidence that some of the cases studied by DREW and his colleagues were probably due to psittacosis virus, and recent work has shown that natural infection with psittacosis virus is more widespread than was once thought. In addition to birds of the parrot family, the fulmar petrel,[8] the domestic pigeon[9] and the domestic fowl[10] are subject to natural infection with this virus. There is even evidence[11] that the so-called cat pneumonia occurring in America may be due to a virus of this group. All these natural infections constitute a possible source of human psittacosis, and there is thus no lack of opportunity for man to acquire the disease. In connexion with the serological diagnosis of these human infections, work in America[12] has shown that the viruses of psittacosis, lymphogranuloma and

1. Dingle, J. H., Abernethy, T. J., Badger, C. F., Buddingh, C. J., Feller, A. E., Langmuir, A. D., Ruegsagger, J. M. and Wood, W. B. *War Med.* 1943, 3, 223.
2. Turner, J. C. *Nature, Lond.* 1943, 151, 420.
3. Peterson, O. L., Ham, T. H. and Finland, M. *Science*, 1943, 97, 167.
4. Weir, J. M. and Horsfall, F. L. jun. *J. exp. Med.* 1940, 72, 595.
5. Smadel, J. E., Green, R. H., Paltauf, R. M. and Gonzales, T. A. *Proc. Soc. exp. Biol., N.Y.* 1942, 49, 683.
6. Eaton, M. D., Beck, M. D., and Pearson, H. E. *J. exp. Med.* 1941, 73, 641.
7. Smadel, J. E. *J. clin. Invest.* 1943, 22, 57.
8. Haagen, E. and Mauer, G. *Zbl. Bakt.* 1938, 143, 81.
9. Coles, J. D. W. A. *Onderstepoort, J. vet. Sci.* 1940, 15, 141. Meyer, K. F., Eddie, B., Yanamura, H. Y. *Proc. Soc. exp. Biol.* N.Y. 1942, 49, 609. Andrewes, C. H. and Mills, K. C. *Lancet*, 1943, 1, 292.
10. Meyer, K. F. and Eddie, B. *Proc. Soc. exp. Biol. N.Y.* 1942, 49, 522.
11. Baker, J. A. *Science*, 1942, 92, 475.
12. Rake, G., Eaton, M. D. and Shaffer, M. F. *Proc. Soc. exp. Biol. N.Y.* 1941, 48, 528. Eaton, M. D. Martin, W. P. and Beck, M. D. *J. exp. Med.* 1942, 75, 21.

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meningo-pneumonitis are all antigenically related; infection with any one will excite the production of antibody to the others. The relationship extends even to the viruses of trachoma and inclusion conjunctivitis.[13] It follows, as SMADEL points out, that the practice of diagnosing active psittacosis infection on a single high-titre observation is unsound; a rising titre of antibody should be demonstrated. And since THOMAS and his co-workers[14] have found that the sera of cases of atypical pneumonia may contain antibody to a variety of normal tissues in addition to virus-containing tissues, serological tests made with sera from this disease with a view to establishing its virus ætiology must be adequately controlled.

Despite all these pitfalls there is good evidence that viruses of the psittacosis group are responsible for some cases of atypical pneumonia. What of the other viruses under suspicion? Neither here nor in America has influenza virus been incriminated; nor is there any further evidence of the rôle of the virus of WEIR and HORSFALL. It seems possible that the virus of lymphocytic choriomeningitis occasionally causes atypical pneumonia. REIMANN, HAVENS and PRICE[15] report one case, the serum of which strongly neutralised this virus, but SMADEL[7] found no evidence of such an infection in any of the 45 cases he examined. Even accepting the virus of lymphocytic choriomeningitis as a cause of atypical pneumonia, this agent together with psittacosis virus would only account for a small proportion of cases. The ætiology of the majority remains undiscovered, though EATON, MEIKELJOHN and others[16] isolated a virus from 17 of 88 samples of sputum from atypical pneumonia by intranasal inoculation of the cotton rat. The work was carefully controlled, and this virus may prove to be the missing culprit. In any case it now seems certain that atypical pneumonia is a virus disease with a multiple ætiology; it is a syndrome and not an entity.

SPECULATIONS ON ALTITUDE SICKNESS

BECAUSE of the need for silence about war-time research, a lecture on the problems of air-travel by HEIM[17] of the United States Army Air Corps hardly refers to work done since 1939, when the subject of altitude sickness was well reviewed by ARMSTRONG.[18] The well-known facts are that exposure to reduced barometric pressure causes signs of anoxia which, though dangerous, are not fully appreciated by the person affected; and that on repeated exposure his condition may seriously deteriorate. A batch of recent abstracts of German papers offer conflicting evidence about the resistance to altitude sickness conferred by carbon dioxide and alkali; and though much of the work seems amateurish—perhaps because the reports are incomplete—some of the ideas may be worth pursuing.

As altitude increases, the partial pressures of water vapour and CO_2 account for an ever-increasing proportion of the total atmospheric pressure in the lungs.[19] The CO_2 pressure does, however, fall somewhat, owing to the hyperpnœa induced by lack of oxygen, and CO_2 is therefore lost to the body, leading to acapnia as well as anoxia. It is generally taken for granted that altitude sickness is due to the anoxia, but Mosso thought it was due to acapnia, and YANDELL HENDERSON has familiarised us with the view that CO_2 is important in its own right in various kinds of resuscitation, and not merely as a stimulus to respiration. One anonymous Italian or German observer[20] points out that the addition of CO_2 to air inspired at low pressures causes, paradoxically, an increase in the alveolar partial pressure of oxygen—this is arithmetically true—and he attributes its benefits entirely to this fact. He casts an unmerited slur on CO_2 by a rebreathing experiment in which, its partial pressure being increased *at the expense of oxygen* (already short), the altitude-tolerance of the subject diminished. POLONOVSKI[21] reopens the possibility that the joint pains following rapid reduction in pressure are due to bubbles of CO_2. The oxygen supply in his experiments was presumably kept adequate; at all events, administration of CO_2 by direct mixture or rebreathing lessened the pains, and so did the ingestion of glucose. A flight to theory follows, and the author correlates glucose in some way with the ease of diffusion of CO_2; nevertheless, the observed facts are interesting. A third effect of CO_2, reported by MERZ and REITER,[22] is to increase the time taken for blood trapped in a tissue to attain a certain degree of reduction. Hydrochloric acid has a similar effect. The usual physiological finding, however, is that the more acid the blood, the less firmly is its oxygen held; in other words CO_2 or other acid tends to expel oxygen from the blood, having the so-called "Bohr effect" on the oxygen dissociation curve. A rise in CO_2 would thus be expected to allow a more complete deoxygenation of the blood in the periphery; but this report, if correct, suggests an actual economy of oxygen usage by the tissues. In view of the strong probability of a metabolic factor in altitude sickness, this claim should be checked. SCHMIDT and COMROE[23] refer to increased oxygen consumption as a known effect of low atmospheric pressure.

The best-established protection against altitude is an adequate supply of oxygen, and airmen are said now to be willingly accepting the regulations prescribing when the mask is to be used. If the alveolar partial pressure of oxygen is maintained, there is, according to some observers,[24] no loss of CO_2 from the body; but this is probably not true when pure oxygen is being inhaled to compensate for a low atmospheric pressure, for CO_2 seems to escape more readily than usual under such conditions.[25,56] If the partial pressure of oxygen is inadequate, either by reason of the mask being neglected or the altitude being too high (even pure oxygen ultimately becomes ineffective), a loss of CO_2 by overbreathing is inevitable. The resulting alkalosis, as pointed out by J. S. HALDANE, would

13. Rake, G., Shaffer, M. F. and Thygeson, P. *Proc. Soc. exp. Biol. N.Y.* 1942, **49**, 545.
14. Thomas, L., Curnan, E. C., Mirick, G. S., Ziegler, J. E., and Horsfall, F. L. jun. *Proc. Soc. exp. Biol. N.Y.* 1943, **52**, 121.
15. Reimann, H. A., Havens, W. P. and Price, A. H. *Arch. intern. Med.* 1942, **70**, 513.
16. Eaton, M. D., Meikeljohn, G., Van Herrick, W. and Talbot, J. C. *Science*, 1942, **96**, 518.
17. Heim, J. W. *J. indust. Hyg.* 1942, **24**, 109.
18. Armstrong, H. G. Principles and Practice of Aviation Medicine, London, 1939.
19. See *Lancet*, 1941, ii, 803.
20. Abstract in *Luftfahrtmedizin*, 1942, **6**, 257.
21. *Ibid*, p. 270 (abstract).
22. *Ibid*, 1942, **7**, 47.
23. Schmidt, E. F. and Comroe, J. H. *Ann. Rev. Physiol.* 1941, **3**, 151.
24. Butler, A. M., Wilson, J. L., Smith, C. A. and Farber, S. *New Engl. J. Med.* 1941, **225**, 255.
25. Dill, D. S., Edwards, H. T. and Robinson, S. quoted by Schmidt and Comroe.
26. Heck, *Luftfahrtmedizin*, 1942, **6**, 52.

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diminish the sensitivity of the respiratory centre, if the pH of the blood were not maintained approximately at the original level by renal excretion of alkaline phosphate. A good method of relieving the kidney of this task, and conserving phosphate, the level of which in the blood is said to fall,[27] is to ingest an acid-producing substance. GREENE [28] thought ammonium chloride helped in his ascent of Mount Kamet, and confirmed his impression later by more exact experiments.[29] However, if it became established that loss of CO_2 was appreciable even when enough oxygen was being inhaled, the obvious remedy would be to add it to the oxygen supply. Hyperventilation from emotional or other causes should not be overlooked in this connexion.

Only if conditions are such that anoxia, and therefore acapnia, are inevitable, do other measures become important. One of these, claimed by BLASIUS and BAUEREISEN [27] to be very effective, is difficult to explain. They give a drink containing glucose, acid sodium phosphate (readily understandable), sodium bicarbonate and citrates. It is difficult to think that the alkali itself is beneficial, and indeed its amount is little more than sufficient to neutralise the buffering effect of the acid phosphate. The subject may be envisaged as drinking more or less what he is going to lose later through his kidneys. The phosphate may represent an important economy, in spite of the destruction of its acidifying properties. On the other hand, glucose may be the active agent. The insidious deterioration of men repeatedly exposed for short intervals to low barometric pressures could be due to the cumulative effect of abnormal metabolic stimuli. Their loss of weight, sometimes voracious appetite, and excessive urine flow are all [18] pointers in the same —admittedly vague—direction. The delayed positive effect on the body-weight of a couple of days' rest in the middle of the experimental period (several days) suggests some deep-seated metabolic disturbance. Although the adrenal cortex has come in for a good share of attention, one of the most striking observations in this field is the curious resistance of thyroidectomised rats to low pressures of oxygen.[30] A thorough investigation of metabolism at low pressures might be helpful.

EVALUATION OF WOUND ANTISEPTICS

THE ideal wound antiseptic should possess high germicidal or inhibitory properties over the widest possible range of the commoner pathogenic organisms, low tissue toxicity, efficiency in the presence of organic matter, power to penetrate, stability, and moderate cost.[31] The final criterion is the clinical one, but the choice of suitable substances from the vast and increasing number now available from chemical synthesis must depend mostly on laboratory tests; and suitable tests are difficult to frame and often ambiguous in their interpretation. The days when comparisons were made on the basis of phenol coefficients are now long past. No one antiseptic can be expected to be equally good in all clinical circumstances. What is good for an old purulent wound will hardly be suitable for a fresh burn in which contamination is light. Accordingly each antiseptic should be examined under conditions which as far as possible resemble those under which it will be used. Thus its antibacterial action should be examined in vitro in the presence of protein as well as in watery media, and a wide range of pathogenic organisms should be employed, including particularly staphylococci, streptococci, coliform bacilli and clostridia, since these are the ones most common and most important on infected wounds.

To determine the toxicity of antiseptics for the tissues, SALLE and LAZARUS [32] in 1935 proposed measuring the minimum concentration required to prevent growth of chick embryonic tissue, and comparing this with the minimum bactericidal concentration. WELCH, SLOCUM and HUNTER [33] estimated toxicity by testing the substances on human leucocytes, and these cells seem very satisfactory as test objects if the results are observed with care and interpreted with caution. Other suggested methods include comparison between the concentration required to diminish the oxygen consumption of live cells in vitro and that required to produce a similar diminution in a suspension of *Bact. coli*.[34] In many methods, determinations of antibacterial action and of toxicity are combined by producing standard lesions in laboratory animals which are then infected and treated by applications of the substance under test. Provided large numbers of animals are used and the findings are properly interpreted statistically, this technique yields the most satisfactory results, but it is too laborious to be applied to a long series of compounds. It would often be well to supplement it by histological observations of the effect of the compound on infected and uninfected tissues.

During the last four years, several completely new wound antiseptics have been introduced. Sulphanilamide is now widely applied to wounds of all kinds; its action is bacteriostatic, not bactericidal, but this weakness is compensated by its innocuousness. Gramicidin has been found useful in some wounds infected with sulphonamide-resistant streptococci; but apparently it is not particularly effective in staphylococcal infections, against which we badly need a weapon, and in general its original promise has not been fulfilled. Penicillin is still unequalled but unobtainable, though Sir JOHN ANDERSON is satisfied with the "very active steps" being taken to make it. Propamidine has only lately emerged as a wound antiseptic, and further experience is needed before we can judge its true value. All these new substances have not prevented a revival of interest in the acridine compounds, introduced for this purpose by BROWNING and his collaborators during the last war. At that time attention centred chiefly on acriflavine, a commercial mixture of 2:8-diaminoacridine (proflavine) and 2:8-diaminomethylacridine, but its popularity gradually waned. This was partly because of its inactivation by pus, partly because of its irritant action, partly because it cannot forget that it began life as a dye, and its affinity for gauze and dressings diverts much of the antiseptic

27. Blasius and Bauereisen, *Ibid*, 1942, **6**, 125.
28. Greene, R. in Smythe's Kamet Conquered, London, 1932, chap. 25.
29. Douglas, C. G., Greene, R. and Keigin, E. G. *J. Physiol.* 1933, **78**, 404.
30. Barach, A. L., Eckman, M. and Molomut, N. *Amer. J. med. Sci.* 1941, **202**, 336.
31. Hunter, A. C. *J. Amer. med. Ass.* 1943, **121**, 25.
32. Salle, A. J. and Lazarus, A. S. *Proc. Soc. exp. Biol. N.Y.* 1935, **32**, 665.
33. Welch, H., Slocum, G. G. and Hunter, A. C. *J. Lab. clin. Med.* 1942, **27**, 1432.
34. Bronfenbrenner, J., Hershey, A. D. and Doubly, J. *J. Bact.* 1939, **37**, 583.

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from the actual wound surfaces. GARROD, however, kept his faith in the flavines, and in the last ten years he, LINNELL, ALBERT and others[35] have explored this series further, gathering information about the relation of chemical structure to bactericidal activity. It seems that in bland efficiency acriflavine is surpassed by proflavine, by 2:7-diaminoacridine, and by 5-monoaminoacridine which is non-staining and highly active. Until lately the flavines were always applied in solution, but MITCHELL and BUTTLE,[36] adapting the technique of local sulphonamide treatment, rapidly converted chronic suppurating wounds into clean ones by applying powdered proflavine. Various British laboratories have tried to reproduce their results in experimental wounds of animals, but proflavine and similar derivatives have all proved destructive to the tissues when applied as a powder, so there is a discrepancy between the clinical and laboratory findings. Much of this discrepancy may arise from the different conditions in which the proflavine was applied. The wounds MITCHELL and BUTTLE treated contained much pus and necrotic tissue, and appropriate surgery preceded application of the chemical. Purulent wounds are difficult to reproduce in an animal and the experimental lesions were necessarily clean incisions. There is no doubt that proflavine and similar compounds will destroy most of the bacteria in a wound when suitably applied; the uncertainty lies in the extent of the damage they do to the tissues and apparently this must be decided by the surgeon rather than the laboratory worker.

Reviewing the conflicting evidence for and against the various acridine compounds, BROWNING[37] concludes that they are highly effective in preventing the development of infection in wounds, and that they can also control established suppuration although their continued use may retard healing. There is much still to be learned not only about the choice of antiseptic but also about methods of application. As GARROD[38] puts it in a masterly review of recent advances, "we have learned the virtues of antiseptics largely by learning how to use them better."

Annotations

THE SURGEONS' MUSEUM

THE prime purpose of a medical museum should be to display specimens in such a way that the visitor gains a vivid impression. In the past most medical museums in this country have been dull collections of ill-presented specimens. What a museum could be like was suggested by the Wellcome Medical Museum, and since its opening in 1929 there has been a serious attempt to improve the standard of museums generally.

The museum of the Royal College of Surgeons in Lincoln's Inn Fields has always been something of a national institution. Its functions have been not only to provide a visual method of preservation and propagation of medical knowledge but also to form a storehouse of material available for research, with ample space for the exhibition of historical collections. It has become a library with a historical section, a reference section and a current section, the specimens taking the place of books or manuscripts. As will be readily appreciated, a national museum with these three functions needs a great mass of material. This material should include common as well as less common and rare lesions. Even the commoner lesions need adequate representation among the exhibits and the spares are likely to yield added knowledge by further examination. The College of Surgeons' museum has always put material to good use in this way, having a large amount of material which is continuously used though it may never appear on the shelves or show-cases. The less common and rare conditions, apart from their interest as rarities, sometimes give a clue which is less clear in the common conditions; the exception is often the starting-point for a new line of research. Of equal importance in a national museum is the historical section. How knowledge has gradually grown, and the material which has contributed to this growth, are matters that can be studied with advantage.

As most readers will know, the Surgeons' museum has suffered considerable damage by bombs, and anyone who can contribute new specimens to it will be contributing to a national museum and to the advance of medicine. Many will be able to collect the commoner lesions, some can send rare specimens, and a few may have specimens of historic interest. All these will be welcomed by the college and will help them to re-establish their unique museum. On p. 792 will be found the names of representatives in various specialties with whom intending donors may make contact.

MECHANISM OF CARCINOGENESIS

THE latest report of the Imperial Cancer Research Fund[1] describes the recent work of H. G. Crabtree on the mode of action of carcinogenic substances. He had earlier found[2] that members of a series of chlor-compounds—e.g., monochloracetone—which reversibly inhibit the glycolytic process of cells also inhibit the rate of tumour induction by chemical carcinogens—e.g., by 3:4-benzpyrene. He then showed[3] that larger amounts of chloracetone tend to influence the process of tumour emergence in the *opposite* direction—that is, a simple inhibitor of cell glycolysis can, under varying experimental conditions, either retard or stimulate the rate of induction of tumours. The compounds producing these effects were non-hydrolysable under physiological conditions, and the potency of their biological action was determined by the chemical reactivity of their chlorine atoms. The work was then extended to embrace compounds so reactive that contact with aqueous media causes hydrolysis, various aliphatic and aromatic acid chlorides being taken as examples of this type, and tested for their effects on the rate of production of tumours (in mice) by benzpyrene.[4] In this series all the compounds showed inhibitory properties alone, the most effective substance being benzene sulphochloride. This contrast between the biological action of non-hydrolysing and hydrolysing chlor-compounds was further emphasised when Crabtree showed that they differed also in their effects on metabolism in vitro—the former producing a specific inhibition of glycolysis, and the latter a non-specific effect due simply to the liberation of hydrochloric acid. Bearing in mind that all the halogen compounds used could also affect other biochemical mechanisms, in particular those involving the sulphydryl group—e.g., processes concerning glutathione and enzymes containing sulphydryl groups, and the normal synthesis of proteins with sulphur-containing amino-acids—Crabtree has studied the effects on tumour induction of various disturbances of sulphur metabolism. For this purpose he used bromo-benzene, since continued assimilation of this substance results, through elimination as a mercapturic acid (acetyl cysteine) derivative, in a lowering of the body reserve of sulphur-containing

35. See Linnell, W. H. *Pharmaceut. J.* 1943, **150**, 102.
36. Mitchell, G. A. G. and Buttle, G. A. H. *Lancet*, 1942, ii, 416.
37. Browning, C. H. *Brit. med. J.* 1943, i, 341.
38. Garrod, L. P. *Brit. med. Bull.* 1943, **1**, 48.

1. See *Lancet*, May 1, p. 563.
2. Crabtree, H. G. *J. Path. Bact.* 1940, **51**, 303.
3. *Cancer Res.* 1941, **1**, 34.
4. *Ibid*, 1941, **1**, 39.

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amino-acids.[5] In one experiment in which 0·3% benzpyrene was applied twice weekly to the skin of mice and 10% bromo-benzene applied on the intervening four days to the same area, the average induction time for papilloma formation was lengthened by 50%. An even more striking result was shown when the concentration of benzpyrene was reduced (to 0·1%) and bromo-benzene applied as before: after 21 weeks not a single wart had appeared, although in a control experiment (using benzpyrene alone) all surviving mice carried tumours. It is obvious that bromo-benzene has a strong retarding action on tumour induction, possibly through the production of a localised sulphur deficiency. Crabtree therefore suggests that the processes of chemical carcinogenesis must possess an intimate relation to the cellular metabolism of sulphur.

These results acquire additional interest when viewed in conjunction with other similar work. Crabtree [4] has himself fully discussed the bearing of his earlier work on Berenblum's original discovery [6] of the retarding influence of mustard gas (dichloroethyl sulphide) on the induction of tumours by tar, and on the efforts by Berenblum and his associates [7] to correlate the rate of hydrolysis, the inhibition of metabolic processes, and the anti-carcinogenic action of mustard gas and its various derivatives and analogues. The newer work with bromo-benzene is also possibly related to the growth-inhibitory properties of many carcinogenic hydrocarbons (and other substances), which White and White [8] suggested might be due to a specific deficiency in the sulphur-containing amino-acids, produced by imposing on the organism an increased requirement for organic sulphur, in the form of cystine or methionine, for detoxication mechanisms. A possible route for the elimination of carcinogens in a detoxified condition through the mercapturates has also been examined by Fieser,[9] extending the finding of Boyland and Levi [10] that the sulphur-containing metabolite of anthracene has the structure of *l*-anthrylmercapturic acid.

These inquiries exemplify the two great processes of cancer research (as indeed of all research)—on the one hand fresh discovery, and on the other an attempt to assess the mutual significance of separate investigations, in which different workers attack the same fundamental problems from different angles and with varied weapons. The process of fact-finding is of first importance, but it constantly gains in stimulus from the effort to set out our data in tentative relationship, so far as is possible, and without underestimating the complexity of the mechanisms concerned.

BEHAVIOUR OF THE VESSELS IN SHOCK

SINCE before the first world war indirect evidence derived from diverse kinds of experiments has been accumulating to show that during the earlier stages of shock the smaller vessels are constricted, possibly throughout the vascular bed. Microscopic observation and measurement of the vessels themselves have been little employed, although these form the most direct method of approach to the problem. Page and Abell [11] have now made photomicrographic records of the state of contraction of the mesenteric vessels and lymphatics of cats, in which shock was produced by constricting the limbs for 3 hours by tightly tied cords or by withdrawing blood from a femoral artery. Their illustrations show that within an hour of the trauma the arteries and arterioles constrict, and that they remain constricted for several hours, giving way to relaxation in most experiments an hour or more before death. The constriction is never sufficient to interrupt the blood-flow, and even the ensuing terminal relaxation is not accompanied by any evidence of pooling or stagnation of blood. The veins also narrow but show less tendency to dilate with the approach of death. Likewise the lymphatics become narrower. Removal of the adrenals, kidneys or pancreas does not significantly alter the changes in calibre of the vessels. Similar vascular reactions have been seen by Page and Abell in the vessels of the rabbit's ear using a transparent moat chamber. The mesenteric vasoconstriction is an active process, for it is observed soon after the application of the injurious stimulus, when the blood-pressure may be above normal, and the walls of the vessels are seen to be thickened. Moreover, in the pithed cat the mesenteric vessels show no constriction, although the blood-pressure may be at a low level for many hours. Page and Abell suggest that the vasoconstriction they have directly observed may be an important factor in the decreased venous return which is one of the chief changes in the circulation in shock. They do not explain the mechanism of the vasoconstriction and it would be interesting to see their experiments repeated in the totally sympathectomised animal. They note that no evidence was found of increased capillary permeability, which Moon [12] believes occurs throughout the greater part of the visceral vascular bed in shock. In the autopsies on many of their animals, hæmorrhagic areas were found in various parts of the heart reminiscent of a phenomenon reported by Sheehan [13] in post-mortem material from cases of obstetric shock, and Wiggers [14] has pointed out that the damage to the myocardium caused by an inadequate blood-supply consequent on hypotension may be largely responsible for the circulatory collapse.

GASTRO-INTESTINAL ACTION OF ATROPINE

IT is well known that atropine produces its peripheral effects by inhibiting the action of acetylcholine produced at the nerve-endings of cholinergic nerves. Atropine also produces stimulation of certain parts of the central nervous system and all the effects of the drug can probably be explained in terms of these two types of action. This is brought out by recent analyses of the action of atropine on the stomach and on the intestine. The investigation of Anderson and Morris [15] was performed exclusively on the human stomach by a method which appears to give reliable results.[16] These investigators found that small doses of atropine produced an increase in the contractions of the stomach while larger doses caused a rapid and lasting cessation of all gastric contractions. The first effect is very probably due to a stimulation of the vagus centre in the medulla and is similar in type to the slowing of the pulse which is often produced by small doses of atropine.[17] The inhibition of gastric activity is, of course, dependent on the peripheral inhibition of vagal action. These results emphasise the need for adequate doses of atropine in the treatment of conditions associated with gastric hypermotility. To put the stomach at rest the traditional gr. 1/100 seems to be insufficient, for this dose given subcutaneously increased gastric motility both in normal subjects and in patients with duodenal ulcer, whereas gr. 1/50 produced a long cessation of gastric contractions.

Youmans, Karstens and Aumann [18] performed their experiments on unanæsthetised dogs. They found that

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the inhibition of intestinal activity produced by the administration of atropine was not decreased by a section of extrinsic nerves (i.e. the vagus and sympathetic). Since there is no good evidence that acetylcholine is continually being produced by the intestine [19 20] independently of its extrinsic innervation, it seems probable that the effect of atropine is due to an action on the intestinal smooth muscle making it unresponsive to acetylcholine. Youmans and his colleagues also made the curious observation that section of the sympathetic rendered the intestine more sensitive to the inhibitory action of atropine; this effect may be due to changes in the blood-supply after removal of the sympathetic innervation.

SIXTH ADDENDUM TO THE BP

THE latest addendum to the British Pharmacopœia 1932 contains 17 new monographs. These deal with two synthetic vitamin-K analogues, menaphthone and acetomenaphthone; two pieces of the vitamin-B_2 jigsaw, riboflavine and nicotinamide (nicotinic acid is already official); the synthetic œstrogen, stilbœstrol; the antiseptic, solution of chloroxylenol, and its other constituents, terpineol and ricinoleic acid; the synthetic compound, dithranol, which differs from the chief ingredient of chrysarobin only in having no methyl group; and a dithranol ointment containing 0·1% in soft paraffin. Two forms of kaolin are included—a light for internal use and a heavy for poultices. Wool alcohols (prepared from the grease of sheep's wool) now replace the beeswax, soft paraffin and olive oil in hydrous ointment and become the basis of many other familiar ointments. Injection of procaine and adrenaline *BP*, which contains 2 g. of procaine and 2 ml. of adrenaline per 100 ml., is given the prefix "strong," and there is a new "weak" injection which is prepared immediately before use by diluting a 2% solution of procaine with three parts of saline and adding adrenaline, so as to give procaine 0·5% and adrenaline 0·2%; the dose of this for infiltration is fl. oz. 10½. Ergot must now contain not less than 0·2% of total alkaloids, calculated as ergotoxine, instead of the previous 0·05%, and the dose of prepared ergot is correspondingly lowered from gr. 5–15 to gr. 2½–8. Yellow soft paraffin may be used whenever white is prescribed. Directions are given for the sterilisation of sulphanilamide; it is to be heated in its final containers for an hour at 150° C., or at 140° C. for four hours, and this is said to produce no more than a slight discoloration.

INDIVIDUAL SPECIFICITY OF HUMAN SERUM

REACTIONS after blood-transfusion may be divided into hæmolytic and non-hæmolytic. The latter may be due to some component of the plasma of the donor or to extraneous matter. The importance of contamination of the sodium citrate solution, or of the apparatus used, has been repeatedly stressed by American authors as a cause of febrile reactions and it has been pointed out that as the standard of care in the preparation of apparatus increases, so does the incidence of transfusion reactions diminish. Nevertheless, the view that all non-hæmolytic transfusion reactions are due to the introduction of extraneous matter seems untenable. Some recipients seem peculiarly liable to develop reactions, even when the greatest care has been taken in the preparation of the transfusion fluid. Recent experience with plasma and serum transfusions has suggested that human plasma may contain antigenic substances which may react with corresponding antibodies in the recipient's serum. Only recently however have such antigens actually been demonstrated in human sera. Cumley and Irwin [21] proceeded in much the same way as did Landsteiner and Levine in the demonstration of the M and N factors in human erythrocytes—that is to say, by injecting human material into animals and then testing the immune animal antisera against a number of samples of human material. Injections of human serum were administered intravenously to rabbits. Later, the rabbit was bled and ring tests were carried out with the serum obtained against a number of samples of human sera. No difference was obtained by direct testing but when the rabbit serum was first absorbed with a given human serum it would still react with other human sera. Using this technique at least 3 "groups" of human serum could be recognised and these were not in any way related to the Landsteiner ABO blood groups. These serum differences are probably constitutional and if so, their importance from the genetical point of view will be considerable. In any case the possible bearing on the ætiology of certain transfusion reactions opens up yet one more field of research in this rapidly growing subject. It is not too fanciful to foresee a time when in addition to carrying out compatibility tests in relation to the red-cell agglutinogens, transfusions will be preceded at least in certain cases by a ring test between the donor's and recipient's plasma.

PREVENTION OF LIVER DAMAGE

IT has long been known that the liver is influenced by certain chemicals and toxins, and attempts have been made from time to time to devise diets that would prevent liver damage. It was held for many years, for example, that a diet rich in carbohydrate would prevent chloroform poisoning. This led clinicians to prescribe large amounts of carbohydrate as a prelude to any kind of operation that might lead to liver-cell necrosis, and the intravenous route was extensively used on the presumption that it favoured for some reason the deposition of glycogen. In 1939 Goldschmidt and others [22] reported that this was not so: glycogen was only stored when the calorie intake was adequate, and hence a liver was only protected against chloroform poisoning when its owner had been well and generously fed for some time. Further work suggested that it was the proteins rather than the carbohydrate that conferred the protection. This was followed by the observations of Whipple on which we have already commented [23]: he showed that when the plasma protein of dogs was reduced they became very susceptible to chloroform poisoning, and that methionine protected them. Ravdin and his colleagues [24] now say that patients can best be protected against liver necrosis by diets which are adequate in calories and contain 20% of protein, 74% of carbohydrate and only 6% of fat. Such diets must obviously be well prepared to be palatable. There seems to be general agreement that diets rich in fat should be avoided. Himsworth and Glynn [25] showed that on diets of this kind rats were much more susceptible to trinitrotoluene poisoning than they were on diets rich in protein or in carbohydrate.

Preventive measures are never welcomed by a healthy population, and although there have recently been epidemics of hepatitis no-one at present is likely to suggest trying to combat them by dietetic means. The effect of rationing however has been to reduce the consumption of fats, and to maintain the intake of calories by raising the consumption of carbohydrate; and it is an interesting reflection that Lord Woolton may all unwittingly have done something to reduce the incidence of hepatitis and TNT poisoning throughout the country.

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In England Now

A Running Commentary by Peripatetic Correspondents

PERHAPS it was the unhinged wanderings of an exhausted mind that made me think of the Medical Profession as I gazed at the cold consommé this evening, but suddenly the wearisome complexities of a controversial day became pellucid clear—there, confronting me on a soup plate, lay the very epitome of the Medical Profession; there in all its transparency lay the explanation of all its troubles. In fact, when I qualified as a doctor, I had not entered a profession in the accepted sense but had been absorbed into a mass with no inherent form, moulded by passing fashion or the caprice of some local pressure. The jelly might quiver in the presence of some great convulsion, it might quake and even disintegrate before a direct assault, but in itself it had no power of movement for it lacked the structure of a vital organism.

We are accustomed to refer to it as The Profession, but who is its head, where its representative governing body, and who will act for it in a crisis? We speak of its ethics, but where are they taught, or where may they be read? During six thousand years has anything more defined than the Hippocratic oath crystallised out from its supernatant fluid? And now, during the past month, we have learned how unfounded is the widely held belief in certain privileges. Dimly I had thought that they at least were defined in international law, but correspondence in the *Lancet* during May casts great doubt on the position of doctors attached to navies and air forces. Apparently some form was given to the matter as regards those with armies—the pressure of a great external force contrived to set the jelly here—but no-one cared what happened to the rest. A situation so surprising seems to call for some comment, but none has been made. It is evidently no-one's concern; the GMC, the Royal Colleges, the BMA, they are the very essence of the jelly. It thus seems probable that the paradox must remain, that part of the medical profession is covered by the Geneva Convention and part is left in the position of ordinary combatants. Indifferent while the conventions were being framed, the profession is inert in the presence of their consequences.

The cold consommé remained untouched; it savoured too much of cannibalism to consume it.

* * *

The answer has now been brilliantly given in Tunisia, but six months ago many people were wondering what sort of soldiers the Americans would make. It was the same in the last war, when we knew far less of their capabilities. The first time they went over the top in that war was when a trench raid on a large scale was arranged for their benefit, as their baptism for the real thing. It was a biggish affair, for several thousand men were engaged, and they were accompanied by some tough and experienced Australian troops to show them the way; clubs and daggers were the favourite weapons, and from all accounts, except the German one, it was a very successful little party. Later, a slightly wounded Australian sergeant arrived at my hospital, and I asked him how the Americans showed up. "Well, Sir," he said, "they are going to be first class, but I'm afraid they are inclined to be a little rough with the Germans."

* * *

In these days of Gallup polls there is some danger of Vox Populi being confused with Vox Dei, whereas in fact it is usually unthinking and uninformed. Here, where the village doctor listens to it as it floats to him over the top dusty row of bottles in the dispensary from the waiting-room, bubbling with airy discourse and anecdote of death and disaster, it is typical. There was last week, for instance, in this light-hearted stream a strong undertow of criticism of the doctor's treatment of the village cobbler, who had suddenly burst an unsuspected peptic ulcer. He was correctly diagnosed and packed off to hospital within an hour, where, having been operated on at once, he died four days later, but Vox Pop felt there had been a rather indecent haste in the matter, and further that nothing was given to the poor fellow to stop his intense pain on the journey. It did, however, give full marks to the doctor for the contagion of his exuberant cheerfulness on his weekly visits to old Mrs. Mouser, whose bedridden saturnity had not evoked this quality in other visitors: "E do be so koind to 'er, listening and larfing, that 'e do reglar buoy 'er up."

* * *

The journalist-expert has been at it again with his confident and confidential information about consultants' fees. Last time a few leading physicians were in the news, and his estimate of their earnings was comparatively modest: ten thousand or so a year was about the high-water mark. But this time he has turned his attention to the surgeons, and has fairly let himself go. For even excluding what to me are astronomical figures—incomes of £100,000—he enumerates a number of fortunates in the £20,000 a year class whom he commiserates on the change to be expected when they receive the flat-rate of a consultant in the problematical state medical service. I wonder what my surgical colleagues think of his computations. Do they, perchance, contemplate with some uneasiness a possible inquisitiveness on the part of income-tax officials? Or can they complacently reconcile the income of fiction with the income of fact?

I hope the journalist-expert's figures are not overgenerous. But, bless my soul, what nonsense he writes. Mr. Cutler, he says, has performed an abdominal operation; of course with his usual skill and efficiency. Apparently until then finance has never been considered, for it is "the patient's friend" who makes the inquiry. "Oh, one hundred and fifty guineas," says Mr. Cutler nonchalantly. "That is more than he can afford," observes the patient's friend, who hands over a cheque which Mr. Cutler casually slips into his pocket unaware that after discount for cash he is receiving fifteen guineas. Yet in his delight he offers the patient's friend a lift in his car. Mr. Scalpel is internationally renowned in a more restricted surgical specialty. His orthodox fee is a hundred guineas. But he "sometimes performs the same operation for ten guineas, and sometimes for nothing."

Surely the layman who reads this twaddle must come to conclusions which are a travesty of the truth. He may conclude that payment for an operation is based on the principle of a dutch auction or an oriental transaction between surgeon and patient—or "patient's friend." He is even entitled to suppose that inquiry as to financial obligation is a mere façon de parler: that the patient may ignore the surgeon's estimate and himself dictate the fee he proposes to pay. References to gratuitous operations are equally silly. The implication is either that the rich must pay for the poor or that eminent surgeons, out of self-sacrifice, benevolence and philanthropy, devote to gratuitous service many hours which might be employed in performing operations at a hundred guineas a time. To create the impression that the rich pay for the poor is grossly improper and reacts unfairly upon the profession. A rich man lives in a constant atmosphere of suspicion that he is being exploited. To tell him that the magnitude of the fee is a compensation for the ill-paid or unpaid services to the poor will be indignantly resented. He may even conclude that he is regarded as a leading character in the play in which the surgeon is Robin Hood. But tell him what is in fact the truth and he will see the justice of the principle—it is in order that they may become efficient and therefore justified in charging him a hundred guineas that Mr. Cutler and Mr. Scalpel gain their experience by operating gratuitously on the poor.

There is no need for any of us, not excluding the most eminent, to make a parade of our benevolence. From our earliest days we accept it as part of our creed. We know that as a consequence we shall always be the victims of abuse and ingratitude. We shall not on that account descend to hypocrisy and humbug. Many a great surgeon is a first-class business man. We need think no less of him for that; and he would be the first to deprecate a halo of sentimentality and his representation as a caricature of philanthropy.

* * *

I was, I suppose, guilty of infamous conduct in a professional respect, so may as well own up to it. As I was taking leave of her my patient asked me to kiss her twice in the same place and I complied. "I'll tell your wife," she said. "She won't mind," I answered. "Perhaps she doesn't think you worth being jealous over?" For this piece of cheek I smacked her behind. The only thing I can say in extenuation is that she is 89.

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MEDICINE AND THE LAW

Adoption Safeguarded

THE new control of adoption, which took effect on June 1st, is stringent. Parliament attacked baby-farming in the Infant Life Protection Act of 1872 but instituted no specific control of child adoption till 1926. The report of a committee in 1937 revealed disquieting evidence of the exploitation of children and mothers. Two years later Miss Florence Horsbrugh, MP, who presided over the committee, had the rare distinction of also piloting through the House of Commons the bill which embodied her committee's recommendations. This amendment of the law was about to take effect on the first day of 1940 when it was indefinitely postponed. War-time conditions, however, were seen to justify acceleration rather than delay. At last the necessary Order in Council, together with an order by the Home Secretary, fixed June 1 as the "appointed day."

The main changes in the law are that henceforth no body of persons other than a registered adoption society or a local authority may arrange for a child to be adopted. Payment for adoption will not be allowed without leave of the court; advertising is restricted and there is special control over the sending of children abroad. To obtain registration a society must establish its bona fides as a charitable association. Registration can be refused or cancelled if the society is not controlled by a responsible committee, if its employees are not fit and proper persons, if their number is inadequate, or if anybody taking part in the society's affairs has been convicted of an offence against the Adoption Acts or the statutory regulations made thereunder.

These regulations should go a long way to eliminate the risk of abuses. The 1939 Act delegates to the Home Secretary a power thus to control the conduct of transactions, and in particular to ensure that parents are told "in ordinary language" their own legal position and the effect of the adoption order. Regulations may require the supervision of each case by a "case committee" of not less than three persons, may prescribe the inquiries and reports which the society must obtain as to the suitability of child and adopter, and may insist on the society's securing a report on the child's health by a registered medical practitioner. When the Home Secretary produced his regulations last March, they were seen to leave very few loopholes for bogus adoptions. Parents or guardians proposing to place a child at the disposition of an adoption society are to sign a form certifying that they have studied and understand a carefully worded memorandum which explains their rights. Whenever a society proposes to hand a child over to the care and possession of an adopter, it must first inquire and obtain reports with regard to the following points. Besides the child's name, address, age, place of baptism and denomination, and the parents' names, address, age and religion, there are copious questions to be answered. Have the parents any other children? Is there any history of insanity, tuberculosis or any other disease in either parent's family? Why is the child offered for adoption? Has it any interest in property and is its life insured? If the mother is alive, does she consent? If the father is alive, is he married to the mother or otherwise liable to contribute to the child's maintenance? As for the adopter, when the report has stated his name, address, country of domicile, age, religion and occupation, it must also state if he is married. If the adopters are a married couple, do they jointly ask for an adoption order? Has the adopter any other child at home? What is the accommodation and condition of the home and what are his means? The names and addresses are required of two responsible persons who can vouch for his character. The report must say whether all the foregoing particulars have, so far as possible, been verified. Has a representative of the case committee seen the adopter and the prospective home and was the latter satisfactory?

When all these searching inquiries have been answered and recorded, there still remains the medical practitioner's report. He must pronounce upon the state of nutrition, the mental and physical development, and the presence or absence of any abnormality of behaviour, speech or articulation. Is there any trouble with the child's ears, nose or throat, its sight or its skin or anything wrong with the bladder or the bones, muscles and joints? Is there any history of fits or rickets or any evidence of paralysis, syphilis or disease of the heart or lungs? Has the child been vaccinated and immunised for diphtheria? If there has been neglect or improper feeding, is its constitution such that good nursing and proper care would make it suitable for adoption? This by no means complete list of the prescribed particulars which the society must obtain will certainly give confidence. The case committee will consider the reports, and someone on behalf of the committee will interview the adopter and will inspect the premises where the child is going to live.

The welfare authorities, it will be seen, have an important task before them but should be well equipped with the facts. The London County Council, which is delegating this responsibility to its education committee, expects to deal with perhaps 125 new cases each year. These figures of children under supervision will, of course, be cumulative because the supervision continues till the child is 9 years old or until a court makes an adoption order.

Letters to the Editor

DOCTORS AND THE FUTURE

"WHERE WE STAND"

SIR,—When I saw the heading of your first leader on June 5, I thought "Now for a lead. We shall at least know where THE LANCET stands." We don't, because you stand first on one foot and then on the other. You are in favour of a National Medical Corporation, but you think health services might instead be run by a guild which would pay the doctors; the local authorities, which would pay the guild; and the Ministry of Health, whose function seems somewhat indefinite. We have seen something of the effects of triple control. It may, with goodwill all round, work admirably. Usually it's a mess.

You show a lamentably unleaderlike vein, too, in your paragraph beginning, "If it is politically impossible or inadvisable to entrust a comprehensive service . . . to a National Medical Corporation . . ." Why should it be? We are told that it is impossible by politicians; but are we children, already subject to the discipline of politicians, that we should accept this view without further explanation, and set obediently about the planning of a second-best course?

Sir, the medical profession is probably the best educated, most intelligent, most altruistic and most worldly-wise group in England today. That isn't saying a lot, I know, but it is something. In addition, doctors usually make able administrators, a personal impression which is supported by that of a friend who has seen much of them in that rôle. We are also necessary to the community and therefore, if for once we could combine and agree, of enormous political power. Most of us are, I think, agreed on five points:

1. The present medical services are inefficient and wasteful.
2. The only cure is a comprehensive medical service with unified control.
3. Good doctoring is done only by doctors who are working happily.
4. Doctors will not work happily under the Ministry of Health or local authorities.
5. There must therefore be a unified comprehensive medical service run by doctors, who should form a National Medical Council under direct Parliamentary control.

Point 4 may be expanded. We should say quite firmly that:—

(*a*) We will not, the war and its special circumstances once over, work under civil servants, because our whole outlook demands that we should accept personal responsibility for all our actions, good or bad, and personally accept the bouquets or the raspberries, as the case may be; because we insist on doing things in what we personally consider to be the best way for the benefit of our patients, and will have nothing to do with "the usual channels" in which good ideas are almost always drowned; because a Ministry has no soul to save or bottom to kick, and to work under it too often breeds

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that sense of frustration which is hostile to the welfare of our patients.

(*b*) We will not, the war and its special circumstances once over, work under medical superintendents, for very similar reasons. Life under a good medical superintendent may be a bed of roses but under a bad one a bed of thorns. I have personally tried both. Probably the maximum degree of administrative efficiency and, for the masses, of happiness, is obtainable under a dictator. We are fighting the whole dictator idea because we prefer freedom to administrative efficiency and because dictators who are both benevolent and efficient are difficult to find.

(*c*) We will not, the war and its special circumstances once over, work under local authorities, because graft is rife in local governments; because we don't think that shopkeepers are likely to be good at running medical services; and because shopkeepers would object to the medical profession taking over their shops.

Lastly, Sir, it is commonly said that we have no real political power because we cannot, for our patients' sake, go on strike. Let us therefore declare, if necessary, a paper strike. Let us refuse to sign any certificates until we get our way. Before so dire a threat, the forces of bureaucracy will wilt and die away.

Whitchurch, Bucks. RAYMOND GREENE.

PROMIN IN TUBERCULOSIS

SIR,—Following the interim report by Dr. Heaf and his colleagues in your issue of June 5, it may be of interest to record my experience of 'Promin' in tuberculous empyema. Through the kindness of Dr. Stanley White of Messrs. Parke, Davis & Co. I obtained a supply of promin solution in glucose which I have used by direct injection into the pleural cavity after aspiration of the effusion. A 20% solution in glucose appears to be safe and does not produce reactions.

Four patients have received this treatment, in all of whom the effusion (arising as a complication of pneumothorax treatment) contained tubercle bacilli. In 3 cases, after injection of 40 c.cm. of the 20% solution on two occasions at fortnightly intervals, tubercle bacillus could no longer be found on microscopical examination or culture; the fourth case was unchanged. The rate of formation of the fluid after aspiration seemed to diminish considerably. It is unlikely that this treatment will obviate the necessity for thoracoplasty later, but the presence of glucose in the solution may encourage pleural symphysis and improve the chances of success for the operation.

One case of tuberculous peritonitis with recurrent ascites has also been treated, 60 c.cm. of a 5% solution in glucose being injected intraperitoneally after paracentesis. Before this the patient had required a laparotomy (at which the diagnosis was established and more than 5 pints of fluid was removed) and subsequent aspiration of 5 pints twice at short intervals. At present, 9 weeks after the instillation of the promin solution, there has been no recurrence of the ascites and the improvement in the general condition and sedimentation-rate has been striking.

It is too early, of course, to form an accurate opinion of the value of the treatment, but it certainly appears worth trial in many of these cases of tuberculous effusion, which are nearly always the source of much anxiety.

Preston Hall, Maidstone, Kent. J. H. CRAWFORD.

INFANT FEEDING

SIR,—Speaking at the Nutrition Society's conference (*Lancet*, June 5, p. 719) Wing-Commander Ellis said that the average child should gain about 4 oz. per week during the first year. I think it more important to emphasise that during the first six months of life a weekly gain of 6 oz. is to be expected. Working in Liverpool clinics I have learned that underfeeding is the commonest fault in artificial feeding. Appetites vary in infants, as they do in adults, and I find that many hungry infants gain at a rate much in excess of 4 oz. weekly when adequately fed. Their excellent progress, their freedom from infections and their sound sleep have led me to believe that a weekly gain of 4 oz. should not be regarded as a criterion of adequate feeding.

Broadgreen Emergency Hospital, Liverpool. EILEEN FINDLAY.

EVACUATION OF WOUNDED BY AIR

SIR,—Your annotation of May 1 recalls the pioneer work done by doctors attached to the RFC and the RAF in the development of air ambulances. It recalls too that no mention of their names is to be found in relevant medical literature. Instead all the credit seems to be given to foreign doctors and authors of articles search about to see on which of these worthies should be conferred the title "Father of Air Ambulances," though there is no evidence whatever that their ideas or theories were ever at any time put into practice. As well might one say that Daedalus or Leonardo da Vinci was the "Father of Modern Aircraft," because in their day they had advanced ideas about flying.

If it is not encroaching too much on your valuable space, I would like to mention the work of two British medical men in this sphere. One of the first doctors, if not the very first, to learn to fly was a Scotsman—Major Alex. Dingwall Kennedy, RAMC, attached to the RFC in Egypt during the last war. According to the *Aeroplane* (Dec. 27, 1933, p. 1095) "Kennedy learned unofficially to fly and became a highly efficient pilot. He was responsible for the first air ambulance because in 1917 he had a DH 9 converted for the accommodation of stretcher cases." The DH 9 was a two-seater machine, and I believe the accommodation for the stretcher was obtained from the front part of the fuselage and the space provided by removal of the back seat. The war over, Kennedy returned to his practice in Wick, where he died unhonoured and unsung as far as ambulance airplanes were concerned. His ideas were not lost, however, for when in 1919 "Z" Expedition Somaliland was being fitted out, the PMO, Wing-Commander Wm. Tyrrell (as he then was), requested that a machine on these lines be constructed. This was again a DH 9 but of course was more elaborate. It had a folding roof permitting the stretcher with patient to be introduced broadside on, and had in addition accommodation for a doctor or medical orderly and a sitting case. It was thought at first that it might be tail-heavy, but it was flown throughout the campaign without mishap. The benefit of its use was strikingly demonstrated right at the beginning; an officer of the Camel Corps requiring urgent amputation for spreading gangrene of the lower limb was flown to the base hospital in 2½ hours—the journey otherwise meant a trek of 5 or 6 days through most difficult country.

The question of the altitude above which patients should not be flown and which you so wisely stress will, I suppose, be largely governed by fighter protection and air superiority. The investigations carried out by Lovelace and others in America were of the laboratory type, done in a low-pressure chamber, and took no account of the intense cold of really high altitudes, a factor almost as important to the wounded or shocked as anoxæmia. According to mythology Icarus flew so high that the sun melted the wax on his wings. Is it not more likely that, in view of present-day experiences of high altitudes, he fell to his doom for want of a de-icing apparatus, an oxygen cylinder, and a BLB mask?

Harley Street, W1. MICHAEL J. SMYTH.

POSTPARTUM HÆMORRHAGE

SIR,—Postpartum hæmorrhage being due to lack of contractility of the uterus after expulsion of the placenta, or to retention of that organ whereby the uterus is prevented from contracting properly, its avoidance should be easy. Limitation of the duration of the labour and the choice of anæsthetic defend the woman from the one; early removal of the placenta defeats the other.

According to Mr. Reddington, in your issue of April 17, chloroform is "the greatest single cause of postpartum hæmorrhage." This is not the only reason that I use spinal anæsthesia (see *Lancet*, 1942, ii, 556), but it is a reason. Spinal anæsthesia has the effect of increasing the contractility of the uterus—even in cases of uterine atony, when the birth process has come to a standstill. In your leading article of April 10 you refer to this beneficent effect of spinal anæsthesia in certain cases submitted to cæsarean section; but you do not apply this to similar cases treated by forceps delivery.

In cases in which, after delivery of the child whether with forceps or not, undue bleeding occurs—and this at

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times happens even with spinal anæsthesia—the placenta should be removed forthwith. If the uterus has not lost its contractility the bleeding immediately ceases; it always stops when the woman is under spinal anæsthesia. The only reason that this is not done at once, without fuss, is that we have all been brought up with the idea that the vagina, and much more the uterus, in the parturient woman is sacrosanct, and that we should introduce nothing into either, not even a douche. As to the introduction of the hand into the uterus, we are to believe that this is a terrible affair, requiring anæsthesia, the presence of an expert, and elaborate preparations. A general anæsthetic, you say, is the best choice; the surgeon's hand should be liberally smeared with a bland antiseptic cream and "the entire vagina" filled with this cream before the hand is introduced into the uterus. But when the genital canal has been distended by a full-term child, why should it be necessary to induce general anæsthesia? One's hand and forearm are less voluminous than the fœtal mass. And how much cream is required to fill the vagina through which the child's head has passed?

The statement that "with all possible antiseptic precautions grave sequelæ will be rare" suggests that all antiseptic precautions before and during delivery—whether with forceps or not—have not been taken. And we know very well that these precautions are not taken: even though the attending doctor may be gowned, masked and gloved, no preparation whatever in the great mass of cases, as far as the genital tract of the woman is concerned, has been instituted. In my practice, with the patient under spinal anæsthesia and in the lithotomy position, not only is the whole pudendal region cleansed with chlorine solution but the Budin catheter is passed into the vagina, up between the fœtal head and the vaginal wall as far as one can get it, to the left and the right, behind and in front. After the child has been delivered a further chlorine douche is given, clearing away all the blood. If then undue bleeding occurs, the gloved hand, washed in chlorine solution, is inserted into the uterus and the placenta removed. After this a chlorine intra-uterine douche is given. Subsequently, chlorine vaginal douches are continued, twice a day for three days and once daily afterwards. The patient, of course, is starved and fluid limited until plenty of urine has been passed, and is kept in the Trendelenburg position. No disquieting effect has occurred with this treatment; and the patients are content.

Rugby. R. H. PARAMORE.

THYROTOXICOSIS TREATED WITH PANCREATIC EXTRACT AND IODINE

SIR,—Nine years ago in your correspondence columns (*Lancet*, 1934, i, 1144) I described the relief of exophthalmic goitre by oral administration of pancreatic extract in a series of 10 cases. I am now able to report a much larger number of cases. Since 1931 I have treated 96 patients with a goitre, exophthalmos, rapid pulse and tremor, along with various secondary manifestations of thyrotoxicosis. Of these 72 are now well and leading a normal existence with little—in many cases, no—evidence of their former illness. In 9 who had toxic adenomatous or cystic goitre, the neck is smaller, although some enlargement is still evident. Of the remainder 10 are still under treatment and reacting favourably. The few cases which have not responded have either been of long standing with permanent cardiac damage or have not persevered. In no case in which treatment was established did fibrillation set in. The average period of treatment was less than 18 months, in none more than three years, and all were advised to carry on with their usual mode of life. The regime consisted of pancreatin (Oppenheimer's palatinoids) gr. 5 three times a day before food and on every second day iodine twice daily between meals either as 'Alphidine' pulverettes, or Lugol's iodine 3 drops in a dose.

This treatment suggested itself to me because of the relief of diarrhœa in toxic goitre which I found to follow pancreatic extract given by the mouth or (in 1934) 'Vagotonine' by injection. My observations agree with those of Bartels[1] of the Lahey Clinic who, in tackling the problem from a totally different angle, suggested the oral use of Dragstedt's[2] lipocaic in combating the diarrhœa of thyrotoxicosis. Kup[3] found that administration of pancreatic extract led to the clearing up of the eczema of exophthalmic goitre and regression of the well-known thyrotoxic symptoms.

I hope that other observers will give this method a trial. It is easy to prescribe and to follow. I would suggest also estimation of blood-iodine levels and the augmented iodine elimination in the fæces (Scheffer)[4] in order to observe the relation between the pancreas and thyroid in disease.

Liverpool. C. BAIRD MACDONALD.

1. Bartels, E. C. *West. J. Surg.* 1941, 49, 439.

SIR ARTHUR NEWSHOLME

SIR,—Your tribute to Sir Arthur Newsholme mentions his work on tuberculosis. May I remind your readers of his report to the Local Government Board and his article in the *Journal of Hygiene* (July, 1906) showing the special influence of segregation in workhouses and workhouse infirmaries in the reduction of the phthisis death-rate. The breadth of his inquiry in this and other countries, the thoroughness and honesty of his statistical evidence, the credit given to other known factors, the searching criticism of accepted argument, gave a new and convincing proof of the value of the abused poor-law and of institutional treatment as such. As a young county MOH, on a pilgrimage to him at Hove some 40 years ago, I had much valuable advice, of which one phrase has endured: "Study vital statistics, Fremantle; they will prove anything you want." I always wondered if he meant "prove" in the Pauline sense.

Hatfield. FRANCIS FREMANTLE.

IDIOSYNCRASY TO PENTOTHAL SODIUM

SIR,—In your issue of Jan. 9 (p. 46) Dr. A. R. Hunter describes cutaneous manifestations of idiosyncrasy to 'Pentothal sodium.' The following case may prove interesting.

A sub-lieutenant RNR was given pentothal sodium for the manipulation of a compound comminuted fracture of the left femur due to gunshot wound. He was a somewhat nervous man and rather apprehensive of the anæsthetic. 'Omnopon' gr. 1/3 and hyoscine gr. 1/200 were given an hour before the anæsthetic. He did not object to the needle puncture, but as soon as the injection of pentothal sodium began he complained of a severe burning pain from the site of the needle down his forearm and hand, "as if he had plunged his hand into the fire." An area of hyperæmia immediately appeared around the needle puncture and spread about 4 inches up his arm, leaving a reddened area about 5 in. long and 3 in. wide. The injection was discontinued and the manipulation performed under nitrous oxide and oxygen. The pentothal sodium had been freshly made up in the usual manner in a 5% solution, and 0·2 gramme (4·0 c.cm.) only was administered. This was sufficient to produce unconsciousness though the slow injection technique was used. There were no other untoward manifestations, and the area of hyperæmia lasted about 24 hours. The case was complicated by the fact that he had well-marked dermatographia, which was discovered during the administration of nitrous oxide and oxygen.

Syringe and needle had been sterilised by the routine method used in the hospital. The arm had been cleaned with spirit, and the area of hyperæmia did not correspond to the area cleaned. There was no doubt whatever that the needle was in the vein.

JAMES LEES.

2. Dragstedt, L. R. *Northw. Med.* 1938, 37, 33.
3. Kup, G. *Dtsch. med. Wschr.* 1936, 62, 538.
4. Quoted in A. W. Elmer's Iodine Metabolism and Thyroid Function, 1938, New York and London.

The Index and title-page to THE LANCET, Vol. II, 1942, which was completed with the issue of Dec. 26, is now ready. A copy will be sent gratis to subscribers on receipt of a post card addressed to the Manager, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

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Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE Whitsun recess gave private members opportunity to raise matters on the adjournment. Mr. Maxton spoke on the status of Newfoundland, other members on food supplies, the members' pension fund, livestock, industry, army lectures and the national health service. It was Dr. Russell Thomas who raised the medical question, but it is unfortunate that he did not apprise all his medical colleagues in the House of his intention to do so. Dr. Thomas protested vigorously against the Minister's methods, and spoke of the medical objection to doctors being placed under local authorities. He considered that negotiations conducted as the Minister was doing would be unfruitful. They had caused bitterness and dismay. Dr. H. B. Morgan, who represents West Indian doctors in the BMA, sharply criticised Dr. Thomas. The present system, he said, was "no credit to the professional organisation in this country or to Parliament's knowledge of medical conditions."

The Minister, in reply, said that the present stage of discussion was preliminary and that we were approaching the second stage when he would be able to put forward in a white-paper a plan for a unified and comprehensive service for purpose of more formal debate and discussion. After this would come the drafting of legislative proposals which would be subjected to the usual parliamentary debate. What emerges from these statements is that the Minister is proceeding on his way toward legislation by the normal route of discussion with those concerned. But what the medical profession needs to know is whether the new system will give us a unified and comprehensive service in which the care of the infant, the school child and the industrial worker will be integrated with the work of the general practitioner, the local-authority and voluntary hospitals and with the public-health services. In the discussions to date the fighting services and the colonial services have not been sufficiently brought into the picture, and a broadening of the basis of discussion to take in every kind of service would be an advantage. Medical MP's intend to get the opportunity for this discussion in the House on the white-paper. But the more of it there is beforehand the better for all concerned. The House of Lords has already contributed seriously to the discussion, but it is with the House of Commons that the major decisions lie.

On the third sitting day in the week of the reassembly of Parliament there will be a second-reading debate on the bill for the setting up of pensions appeal tribunals, which follows the lines of that passed after the last war, but its scope is extended to members of the Mercantile Marine, the Civil Defence services and civilians injured by enemy action. The delay in setting up this PAT machinery has been serious, and the reason given, the shortage of doctors, is not less acute now than it was a year ago. There will be criticism, too, along the lines of "fit for service, fit for pension," which, while not acceptable in that form, may lead to a considerable extension of the acceptance of liability beyond the present limits of "attributable to or aggravated by service."

The House of Lords did some more pioneering in its last session, which gives the expression "backwoods peers" a new meaning. The most significant statement in the debate on population was made by the Duke of Devonshire, who said that nearly all the countries of North Western Europe, with the exception of Russia, are faced with a similar phenomenon—namely, a decline of the birth-rate. An authoritative inquiry into the whole matter was asked for, to look at fundamentals and to answer the question why the population of the Soviet Union and of India is going up and the populations of the Western democracies with their high standards of living are going down.

FROM THE PRESS GALLERY

Population Problems

In the House of Lords on June 8 Earl DE LA WARR called attention to the threatened decrease in population in this country and asked the Government what consideration they were giving to the problem. He asked for a continued attack on mortality, for family allowances and generous income-tax rebates for children, and an immediate inquiry into the facts, causes and effects of declining population.

Lord NATHAN was anxious that large families should once more become "the thing," otherwise, in the words of Sir John Clapham, a multitude of never-born Europeans might well exceed the losses of battle. Our problem was to raise living and reproduction standards at the same time. Viscount SAMUEL pointed out that smaller families were not due to physical sterility, but were the result of deliberate decisions on the part of parents. Children's allowances and housing and public health measures would help, he believed, to change the present trend, but most important of all was to make the nation population minded. Lord GEDDES suggested that much of the unwillingness to have children got its origin in the germ plasm. He begged the Government not to assume that this was merely a political problem, but to realise that it might also be a biological problem.

Viscount DAWSON OF PENN said that the change in the composition of the population and the decline of the birth-rate were accepted by everyone. He thought there should be an inquiry, not by a Royal Commission, but by a widely representative scientific body like the Royal Society. He would say that there had been no diminution in the love of children in this country, but side by side with it had developed a more sensitive conscience about the individual life. In the human race sex relations not only served the purpose of reproduction but were part and parcel of the physical attachment between people as husband and wife, and their periodical satisfaction was part of our civilisation. In the last century there were a succession of pregnancies every eighteen months to two years from the date of marriage until the fecundity of the couple had exhausted itself. This meant a very large birth-rate, but if all the children had lived life would have been economically impossible. People in those days were accustomed to losing their children, but today our girls would break their hearts at losing one. In Victorian days the infant death-rate was 160 per 1000; it had now come down to 49. He submitted that it was the gradual pressure of events which led people to bring contraception to the front of the stage. People wanted not quantity of children but quality. Today medicine was keeping people alive—not perhaps always desirably—but it was its duty to do so. This generation was going in for fitness, and doing it extremely well. Care of children had never before been so great. He had no belief in an insufficient fertility. Time and again when contraception was taken off pregnancy began, although not always as quickly as one would wish. He did not dispute that there might be in the background a change in the germ plasm, but small families was the first reaction to a knowledge of contraception. The Churches had made a fundamental mistake in condemning contraceptives as such. If the Churches had insisted that contraception must be used rightly, they would have kept their influence. That error had slowly to be lived down. One of the causes of smaller families was fear of unemployment and anxiety for the careers of the children. Family allowances were sound if only for the reason that a child is no longer inevitable but is a voluntary contribution to the State. But alone they would not be sufficient. Lord Dawson thought it should be brought home to young married people that the way to get health and preservation in life was the periodic use of the function of reproduction. This was especially true in these days of safe maternity. It ought to be impressed on young women that pregnancy and maternity were extremely safe proceedings. Propaganda was needed pointing out to parents that it depended on them whether England remained a great power, and that the possession of children would bring them health and the enduring happiness of family life.

The Duke of DEVONSHIRE, replying for the Government, admitted that he was among the alarmists. The population problem was not confined to this country; nearly all north-western Europe, except Russia, was faced with a similar phenomenon. Protagonists of every kind of view drew ammunition from

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the birth-rate. The pacifist said that women will not bear babies to be killed, yet the decline began before we thought of world wars. The social reformer said that women will not bear babies to live in slums, yet the birth-rate is if anything higher in slums than in garden cities. By all means clear away slums, but he did not believe that would solve our problem. The Minister of Health proposed to publish a document on the lines of the recent White Paper in which the statistical outlook would be set out and discussed in a balanced manner. It would take into account evidence which had become available, since the issue of the White Paper.

Scottish Health Services

Though the debate in the Commons on June 8, it was admitted, "clearly showed the vigour of the Scottish way of expressing things," Mr. T. JOHNSTON, the Secretary of State, was able on the whole to give a good report of the country's health. Last year the death-rate for females was the lowest in our history; and the records of school entrants in Glasgow for 1942 showed increases in the weights and heights of boys and girls. He compared the figures for the decade 1851–60 with the figures for last year, and showed that, per hundred thousand of the population, smallpox deaths had fallen from 35 to 1, measles from 43 to 3, scarlet fever from 98 to 1, diphtheria from 44 to 6, whooping-cough from 72 to 2, diarrhœa from 106 to 22, bronchitis and pneumonia from 201 to 110, and even tuberculosis, though it was now giving some cause for anxiety, had fallen from 360 to 84. Deaths from typhus and enteric had been almost wiped out in the same period and infant mortality had been halved. In 1942 it was 14 per thousand better than in 1941, and with the single exception of the year 1939, when the rate was fractionally lower, the figure for 1942 was the lowest on record. On the other hand, tuberculosis, which had been halved between the two wars, was again unfortunately on the increase. The notifications for pulmonary tuberculosis had increased by 31% since the war began, and no doubt the mass radiography experiments which they hoped to begin this summer would throw up other incipient cases. He was allocating 800 additional beds in the emergency hospitals for treatment of TB, and they had about 500 cases awaiting beds and nursing staff. To induce patients to go early for treatment maintenance allowances were being provided.

Through an arrangement between the voluntary and emergency hospitals, they had succeeded in wiping off 15,000 patients from the waiting-lists of the voluntary hospitals. Through the Clyde Basin experiment, now called the Supplementary Medical Service in Scotland, over 3700 cases, mostly young workers, had been dealt with up to the end of May. Many young war workers had the timely intervention of this scheme. Mr. Johnston trusted that the scheme would be permanently grafted on to the health services. At Gleneagles a fitness centre for injured miners had been opened. His department had also taken 1000 men and some women invalided from the Forces and put one of their medical officers on to the job of following them up to see how they fared in civil life. From the test examinations it appeared that about 20% of these people were trying to do work quite unsuited to their physical condition. In consultation with the Ministry of Labour, the Department of Health had secured more suitable employment for many of them.

QUESTION TIME

Coal-miners and Pneumokoniosis

Sir WILLIAM JENKINS asked the Home Secretary the cause of the delay in issuing the regulations dealing with the pneumokoniosis disease: and what is the increase in the number of men suffering since 1941 to the latest available date.—Mr. O. PEAKE replied: I understand that question refers to the compensation scheme and benefit scheme for this disease amongst coal-miners. The delay is due to the necessity for consulting the employers and workers associations. Representations have been received which are under consideration and the Minister hopes to settle the schemes shortly. I regret that no figures as to the number of men suffering from pneumokoniosis are available.

Medical Services of Government Departments

Sir PERCY HURD asked the Secretary to the Treasury what departments had medical services of their own; what was the total personnel and cost; and was it proposed to bring these departmental services into the new national health organisation.—Mr. R. ASSHETON replied: In the Post Office a headquarters medical branch of about 25 is maintained at an estimated annual cost of about £12,275 and in addition capitation fees amounting to about £65,000 a year are paid to some 2600 local medical officers. Much smaller services of the same kind are provided in the Inland Revenue, Customs and Excise and Ordnance Survey departments, occupying in the aggregate less than half a dozen officers and costing under £2000 a year. Medical service is at present provided in Ordnance factories under the Ministry of Supply, but detailed information is not yet assembled. This will be one of the matters to be considered in organising any new national health service.

Supply of X-ray Tubes

Mr. CRAIK HENDERSON asked the Minister of Health whether he was aware that the treatment of cancer and other cases was being seriously handicapped by the delay at present involved in obtaining the necessary X-ray tubes; and whether he would take steps to simplify the procedure and expedite delivery.—Miss F. HORSBRUGH replied: The Minister is aware of the shortage of deep X-ray tubes which have to be imported from America. The Ministry, in conjunction with the Ministry of Supply, are taking all possible steps to secure an increased number of these tubes. As soon as a consignment is received in this country by the Ministry of Supply, they are allocated, on the advice of the Ministry of Health, to hospitals most in need of them.

Waiting List of Tuberculous Patients

Replying to a question the Minister of Health said that on March 31, 1943, the numbers of tuberculous patients in the several counties who had been waiting for a bed for more than ten days were as follows:

County	Pulm.	Non-pulm.	County	Pulm.	Non-pulm.
Beds	15	11	London	13	1
Berks	14	1	Middlesex	188	23
Bucks	12	2	Norfolk	1	1
Cambs	13	1	Northants	2	—
Cheshire	39	13	Northumb.	15	2
Cornwall	16	—	Notts	87	—
Cumberland	31	3	Oxon	19	4
Derby	25	31	Salop	9	—
Devon	43	3	Somerset	23	3
Dorset	6	—	Staffs	81	6
Durham	141	15	East Suff.	3	—
Isle of Ely	2	1	Surrey	197	20
Essex	100	29	East Sussex	9	3
Glos. Jt. Board	64	14	Warwick and Coventry Jt. Bd.	53	30
Hants	39	21	Wight, Isle of	2	2
Hereford	8	—	Wilts	10	9
Herts	17	2	Worcs	40	2
Hunts	5	—	Yorks—East R.	9	—
Kent	110	6	Yorks—North R.	6	—
Lancs	280	48	Yorks—West R.	214	25
Leics	34	12	Wales	159	36
Lincs Kesteven	9	1	Monmouth	56	22
Lincs Lindsey	12	3			

Penicillin Clinical Trials Committee

Major LYONS asked the Lord President of the Council if he would give the names of the committee established by the Medical Research Council in connexion with penicillin; and whether this committee was charged with the direction and conduct of penicillin trials.—Sir JOHN ANDERSON replied: The committee is known as the Penicillin Clinical Trials Committee; its function is to organise clinical trials with penicillin. The following are the names of the committee: Prof. H. R. Dean (chairman); Dr. A. H. Drury; Prof. A. Fleming; Prof. H. W. Florey; Dr. Percival Hartley; Mr. R. Vaughan Hudson; Dr. C. M. Scott; Dr. J. W. Trevan; Prof. R. V. Christie (secretary), and Prof. L. P. Garrod (asst. secretary).

Major LYONS: Is there consultation or coöperation between that committee and the committee set up by the Minister of Supply?—Sir J. ANDERSON: Yes. The latter committee is primarily concerned with production, although it has to take clinical requirements into account. The committee with which I am concerned has to organise and supervise clinical trials. There is considerable ground of common interest between the two.

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Commander LOCKER-LAMPSON: Has penicillin proved its value?—Sir J. ANDERSON: I think that has been established.

Children's Distaste for Vegetables

Captain PLUGGE asked the President of the Board of Education whether he would investigate the reluctance of children to eat vegetables; and whether he could indicate the standard of cooking of these articles in school meals?—Mr. BUTLER replied: I am advised that much progress is being made by means of careful social training and good cooking in overcoming children's prejudices which are mainly due to unfamiliarity. Nowadays as much attention is paid to the cooking of vegetables as to the preparation of other dishes.

Obituary

WILLIAM RICHARD CYRLAS-WILLIAMS

MRCS; CAPTAIN RAMC

W. R. Cyrlas-Williams was educated at Christ College, Brecon, and Peterhouse, Cambridge, where he won the freshmen's long jump. In 1937 he went up to University College Hospital where he was a fast wing three-quarter in the rugby XV, a useful fast bowler, and a polished hard-hitting batsman with a good eye. Although handicapped by an accident and ill health he qualified in 1941 and took up a resident post at the West Kent Hospital. It was during his time here that he married a former student of UCH, Ruth Colyer, who was then working as pathologist at the South-Eastern Blood Transfusion Depot. In 1941 Cyrlas-Williams joined the RAMC, and for over a year he was engaged in the strenuous exertions of training with a light field ambulance. In October, 1942, he was posted as regimental officer to the reconnaissance unit with which he was serving when he was killed in the North African fighting, three months after landing.

G. B. writes: "It was always an inspiration to see Williams in his enthusiastic moods, and one could not fail to fall in with them, for his delight in games, his enthralment in books and photography, his pride in his car and his travels in it to the West Country, and his happiness in his married life were all obviously genuine. The last time I saw him was on a Saturday afternoon some months ago. After a strenuous week finishing at lunch-time he cycled ten miles with his golf-clubs, joined in some cricket practice and a round of golf, and after a snack of a meal he was off and gone. And now he is finally gone, but the infection of his enthusiasm will not be lightly stamped out."

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED JUNE 5

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1921; whooping-cough, 2144; diphtheria, 630; paratyphoid, 6; typhoid, 4; measles (excluding rubella), 7660; pneumonia (primary or influenzal), 768; puerperal pyrexia, 169; cerebrospinal fever, 79; poliomyelitis, 5; polio-encephalitis, 2; encephalitis lethargica, 6; dysentery, 125; ophthalmia neonatorum, 107. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on June 2 was 2125. During the previous week the following cases were admitted: scarlet fever, 167; diphtheria, 47; measles, 90; whooping-cough, 47.

Deaths.—In 126 great towns there were no deaths from enteric fever or from scarlet fever, 1 (0) from measles, 11 (0) from whooping-cough, 9 (3) from diphtheria, 51 (13) from diarrhœa and enteritis under two years, and 6 (0) from influenza. The figures in parentheses are those for London itself.

Birmingham reported 5 deaths from diarrhœa, Manchester 4.

The number of stillbirths notified during the week was 228 (corresponding to a rate of 34 per thousand total births), including 22 in London.

Messrs. PERGA Ltd. point out that they have not ceased to manufacture the waxed cardboard milk containers which were described as unobtainable in the *Lancet* of May 29, p. 686.

Notes and News

INDUSTRIAL HEALTH ADVISORY COUNCILS

AT Mr. Bevin's health conference several speakers stressed the importance of the workers themselves taking an active interest in measures to promote safety and health, and in some factories safety and/or health committees have been set up. One of the difficulties that faces these committees in factories where no medical officer is available is how to obtain professional advice on points to note as indications of general health trends. The Leicester branch of the Socialist Medical Association has endeavoured to bridge this gap by calling a meeting of workers' representatives when an outline was given of the problem as seen by medical and allied personnel. Considerable information about health conditions in local factories was obtained and questionnaires distributed so that further details might be submitted and collated. A second meeting was then held, this time for health workers—doctors, nurses, social workers, welfare officers and the information received in the questionnaires was put before them and a local industrial health advisory council was set up. The preliminary meetings were arranged with the local district trade-union production committee and it is expected that the advisory council will find it most satisfactory to work closely with this committee throughout.

DINNER IN HONOUR OF DR. TRUETA

ON June 9 a dinner was held at Frascati's Restaurant to celebrate Dr. Josep Trueta's D Sc Oxfd honoris causa. In his reply to the speech of Señor Ramon Pereira, president of the Casal Catala, Dr. Trueta said that the main concept of his method of treating war-wounds was faith in Nature's healing power. Plaster-of-paris was but part of the treatment—it ensured complete rest for the tissues, but that was its only quality and purpose. The principles of the treatment of war-wounds could well be applied to the political ills of modern society. Early and thorough cleansing—soap and water—was the most certain way of checking the pollution of such evils as fascism. When such pollution had become established, as in the infected war-wound, radical excision or total ablation of the affected part was necessary—hence the "unconditional surrender" clause in the Allied peace terms. The infected wound must be laid wide open; all functions and activities of the state must be open to all in the healthy democracy. There must be free drainage; freedom of speech, thought and religion. Lastly, civilisation needs to be protected, so that with proper rest and relaxation it can proliferate, develop and flourish. He might have added that all this will fail if the body is not properly nourished.

University of Glasgow

Prof. James Hendry has been appointed to the regius chair of midwifery in succession to Prof. S. J. Cameron who is retiring. Professor Hendry at present holds the Muirhead chair of obstetrics and gynæcology in the university.

Dr. Hendry, who is 57 years of age, graduated in medicine and science from the University of Glasgow in 1910 and after post-graduate study in Austria and Germany, returned to Glasgow in 1913. When the last war broke out he held a commission in the university contingent of the OTC where until 1916 he acted as adjutant and was awarded the MBE for his military services to the university. He was on active service in France from 1916 until the end of the war. In 1919 Dr. Hendry was appointed first assistant to the Muirhead professor and the following year he became senior assistant physician to the Royal Maternity Hospital where he is now chief obstetric surgeon. He is also gynæcologist to the Glasgow Royal Infirmary. Professor Hendry has been a member of the university court since 1939, and he is a member of the medical advisory committee to the Secretary of State for Scotland and of the Goodenough Committee on medical schools. He is deputy chairman of the Central Midwives Board for Scotland. He is joint author of *Notes on Midwifery* and a *Combined Textbook of Obstetrics and Gynæcology*.

Discussion on Milk

The Nutrition Society and the food group of the Society of Chemical Industry will hold a discussion on milk at 11 AM on Saturday, July 3, at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. Prof. H. D. Kay, D Sc, will be in the chair and the following papers will be read: Mr. J. L. Davies, "the production, supply and marketing of milk; Mr. A. T. R. Mattick, Ph D, bacteriological aspects of milk processing and distribution," and Mr. S. K. Kon, D Sc, the chemical composition and nutritive value of milk and milk products. Other speakers will include Mr. W. R. Wooldridge, Ph D, Prof. A. W. Ashby and Prof. G. S. Wilson, FRCP.

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Royal College of Surgeons of England

As mentioned in an annotation on another page, a systematic effort is being made to collect specimens for the museum of the college, which has been seriously damaged. Intending donors are asked to get in touch with a collector in the appropriate specialty, as follows: surgery, Mr. R. H. O. B. Robinson (St. Thomas's); diseases of the stomach and gall-bladder, Sir James Walton (London Hospital); diseases of the thyroid, Mr. Cecil Joll (Royal Free); proctology, Mr. L. E. C. Norbury or Mr. E. T. C. Milligan (St. Mark's); urology, Mr. H. L. Attwater (All Saints') or Mr. John Everidge (King's); ophthalmology, Mr. A. J. B. Goldsmith (Royal London Ophthalmic) or Mr. Eugene Wolff (Royal Westminster Ophthalmic); otorhinolaryngology, Mr. V. E. Negus (King's) or Mr. F. C. Ormerod (Westminster); gynæcology, Mr. Aleck Bourne (St. Mary's); pædiatrics, Dr. A. W. Franklin (Bart's) or Dr. A. G. Signy (Staines Emergency Hospital, Ashford, Middlesex); pathology, Dr. R. W. Scarff (Middlesex); odontology, Mr. P. Buckley Sharp (60, Portland Place, W.1); comparative medicine, Dr. E. G. White (Research Institute, The Beeches, Streatley, Berks). The chairman of the committee on the restoration and reorganisation of the museum is Prof. G. Grey Turner; the members are the president and vice-presidents of the college (ex-officio), Mr. Joll, and Sir James Walton.

A meeting of the council was held on Thursday, June 10, with Sir Alfred Webb-Johnson, the president, in the chair.

Prof. G. Grey Turner was reappointed representative on the council of King's College, Newcastle-on-Tyne. Air-Commodore P. C. Livingston was appointed Moynihan lecturer for 1943.

It was decided to recognise for the duration of the war the posts of resident surgical officer and house-surgeon at the Connaught Hospital, Walthamstow, for the six months' surgical practice required of candidates for the final fellowship examination.

Diplomas of fellowship were granted to the following:

A. F. Clift, H. S. Joseph, T. P. N. Jenkins, Alfred Cavendish, Sidney Mottershead, K. H. S. Dalliwall, E. R. Davies, Claude Brun, R. B. Zachary, R. H. Percival, Douglas Ranger, H. L. McMullen, E. L. Farquharson, and I. A. Page.

Diplomas of membership were granted to I. M. MacArthur and R. J. T. Woodland. Diplomas in anæsthetics, jointly with the Royal College of Physicians, to the following:

Alfred Beck, Una M. Campbell, Maeve Cronin, H. W. L. Dale, D. E. Dunnill, J. C. Easson, G. E. H. Enderby, C. W. Fleischmann, A. J. Fraser-Simson, Evelyn W. Glennie, D. C. Howard, P. T. Merlin, S. E. Osborne, Christine M. Rendell, Helen M. Rossiter, B. A. Sellick, G. H. T. Stovin, and H. Q. O. Wheeler.

Notification of Scabies in London

The Minister of Health has made it compulsory from Aug. 1 for doctors to notify cases of scabies in the county of London to medical officers of health.

Middlesex County Medical Society

A meeting will be held at Grange Park School Clinic, Lansbury Drive, Hayes, at 3.30 PM on Wednesday, June 23. After a visit to a day nursery, Dr. Marjorie Back will speak on day nurseries, summarising county experiences, and Dr. Wright will read a paper on work done at the school clinic. The film, *Modern Control of Scabies*, will also be shown.

Rehabilitation of Disabled Nurses

As part of the interim scheme of the Ministry of Labour and National Service for the training and resettlement of disabled persons, arrangements will be made (Ministry of Health Circular 2824) for the rehabilitation at Government expense of disabled state-registered nurses who are not fit to return to their previous work, but are suitable for training as industrial nurses, sister tutors, or health visitors.

Tests for Syphilis during Pregnancy

The executive committee of the National Association of Maternity and Child Welfare Centres and for the Prevention of Infant Mortality has resolved: (*a*) that the physical and social disadvantages accruing to a child born with congenital syphilis are such that everything practicable, including the routine application of the Wassermann, Kahn, or other tests to the mother's blood as initial pointers during pregnancy, should be done to diagnose the condition at the earliest possible time in order that effective treatment may be given; (*b*) that the Ministry of Health be urged to give practical effect to this opinion by propaganda, stimulation of welfare authorities and of voluntary hospitals and clinics.

Royal Society of Medicine

On Thursday, June 24, at 2.30 PM, the section of dermatology is holding a special meeting with medical officers of Royal ordnance factories which will be opened by Dr. Sibyl Horner. Dr. A. C. Roxburgh will read a paper on diseases liable to be mistaken for industrial dermatitis and a medical officer of the Ministry of Supply will describe the effects on the skin of TNT, tetryl, &c. The section of orthopædics will meet on Saturday, June 26, at 2.45 PM, at Princess Mary's RAF Hospital, Halton, Bucks, when there will be a symposium on war wounds, fractures and burns. Squadron-Leader J. C. Scott will speak on emergency treatment, Mr. A. H. McIndoe on skingrafting of wounds, Air-Commodore H. Osmond Clarke on infected fractures and non-union, Squadron-Leader D. C. Bodenham on burns of the limbs, and Flight-Lieutenant M. Squire on contracture of toes and fingers after war wounds.

Medical Honours

The DSC has been awarded to Surgeon Commander Jack Coulter, MRCS, RN, and Surgeon Lieutenant James Murray MB, RNVR.

To the list of honours conferred on members of the medical profession (see p. 750) should be added the MBE (Civil) to Dr. Frederick Middleton, secretary of the Saskatchewan cancer clinic service.

Medical Casualties

The following casualties have lately been announced.

Killed in action.—Lieut.-Colonel Angus Macdonald, MB EDIN, RAMC.

Died.—Lieut.-Colonel Harry Pomeroy, FRCS, AAMC.

Dr. Roderic Macbeth is now officially reported to be interned in Singapore.

Births, Marriages and Deaths

BIRTHS

BEHRMAN.—On June 9, in London, the wife of Dr. Simon Behrman, of Harley Street, W.1—a son.

BRAMWELL.—On June 12, the wife of Captain J. Byrom Bramwell, RAMC—daughter.

CARGIN.—On June 4, at Guildford, the wife of Dr. J. B. Cargin, of Woking—a daughter.

DOUGLASS.—On June 7, at Edgware, the wife of Surgeon-Lieutenant W. Michael Douglass, RNVR—a son.

FAIRLIE-CLARKE.—On June 8, at Malvern, the wife of Surgeon-Lieutenant G. A. Fairlie-Clarke, RNVR—a son.

GLOVER WILSON.—On June 5, the wife of Surgeon-Lieut.-Commander T. D. Glover Wilson, RNVR, of Okehampton, Devon—a son.

HARTLEY.—On June 4, at Freeland, Oxford, the wife of Lieutenant Peter Hartley, RAMC—a daughter.

HAWKING.—On June 6, in London, the wife of Dr. Frank Hawking—a daughter.

MACBETH.—On June 11, at Oxford, the wife of Mr. Ronald Macbeth, FRCS—a daughter.

MACDONALD.—On June 10, in London, the wife of Capt. D. G. C. Macdonald, RAMC—a daughter.

MARTIN.—On June 6, in London, the wife of Captain J. K. Martin, RAMC—a son.

SAMES.—On June 11, in London, the wife of Mr. C. Patrick Sames, FRCS—a son.

SCOTT.—On June 8, in London, the wife of Dr. Rupert Scott—twins, boy and girl.

WILTON.—On June 9, in London, the wife of Surgeon-Lieutenant T. N. P. Wilton—a daughter.

MARRIAGES

BARKER—EMERSON.—On May 25, at Bethersden, Kent, Roger Frederic George Barker, surgeon lieutenant RNVR, to Sheila Helen Emerson.

DROOP—BOSWORTH.—On June 5, at Liverpool, Reginald Charles Droop, MB, captain RAMC, of Newton-on-Trent, Lincoln, to Joan Bosworth.

GELBER—EDWARDS.—On June 12, at Edinburgh, George Ludwik Gelber, MB, cadet officer, to Ethel Florence Edwards, MB.

PENISTAN—READE.—On June 5, at Bentley, Essex, John Llywellyn Penistan, to Violet Mary Reade, ATS.

DEATHS

JOHNSTON.—On June 2, at Copheath, Warwick, Leslie Charles Johnston, LRCPI, DPM.

MELVILLE.—On June 8, at St. Albans, Charles Henderson Melville, CMG., MB EDIN., DPH, colonel late RAMC, aged 80.

PRITCHARD.—On June 10, at Hove, Edward Thomas Pritchard, MD EDIN., aged 85 years.

ROWAN-ROBINSON.—On June 11, Frederick England Rowan-Robinson, MB EDIN., late major, RAMC, of 26, Meadway Court, London, N.W.11, aged 65.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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CHEMOTHERAPEUTIC DRUGS IN ANAEROBIC INFECTIONS OF WOUNDS *

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NUMEROUS investigations have been carried out on the chemotherapy of gas gangrene, both from the experimental aspect and in its practical application, but there is still diversity of opinion as to its real value. An analysis of recent returns on cases of gas gangrene from casualties among the fighting forces and civilians failed to show any appreciable reduction in its incidence in spite of both prophylactic and therapeutic chemotherapy.

We reviewed some of the published work in a previous paper in which we pointed out that the experimental findings did not give such good results as had been hoped for when applied to war wounds and air-raid casualties (McIntosh and Selbie 1942). In this paper are given the results of some further experimental investigations carried out with the idea of explaining the discrepancy and finding more efficient remedies. A large number of chemotherapeutic substances have been tested, but here we have restricted the details to those found most effective, in particular the sulphonamides, the acridines and penicillin.

Much of the discrepancy appears to arise from the fact that the testing of chemotherapeutic substances on anaerobes is a complex procedure. This is due to two factors. The first is the inherent difficulty of anaerobic cultivation, intensified as it is by the use of the poor media necessary for bacteriostatic testing—it often needs careful balancing between nutritional value and anti-bacteriostatic effects of the medium to get a reading at all, particularly with recently isolated strains. The second difficulty is the therapeutic test in animals, in which many different procedures are used to produce the experimental infections. In some procedures little or no account is taken of the actual number of bacteria injected, and again divers methods are employed to produce the muscle injury, either mechanical or chemical; sometimes open wounds are preferred and sometimes closed. In estimating the chemotherapeutic value of a drug it is also necessary to take into consideration both its bacteriostatic action and toxicity.

Earlier experiments showed that mice are relatively susceptible to anaerobic infections, and therefore to facilitate the testing (an important consideration in wartime) only mice have been used in our recent experiments. The method adopted for the therapeutic testing was to inject the known dose of bacteria into the muscle of the right thigh and an hour later to inject in the same site the chemotherapeutic substance. This interval allows the microbes to penetrate into the muscle and so establish a spreading gas-gangrene infection. If the remedy is injected immediately after the injected dose its effects are of course much enhanced, but the action is apparently that of an antiseptic, since substances with no chemotherapeutic action may be effective.

BACTERIOSTATIC ACTION

The medium found satisfactory for the bacteriostatic tests was ½ strength meat broth plus 0·2% glucose, but where difficulty has been found in obtaining satisfactory growth with this medium full strength broth has been substituted.

The medium is inoculated with 0·5 c.cm. of an 18-hour culture of the anaerobe containing approximately a million viable bacteria, though in the case of some anaerobes, particularly *Clostridium œdematiens* when freshly isolated, at least double this amount is required. Before use the medium, to which sterile glucose has just been added, is boiled for 10–15 minutes and then cooled rapidly; the required amount of drug is added to the first tube and then serial dilutions are made quickly in the remaining tubes. The tubes are then inoculated with a young growing culture (18 hours), placed in a McIntosh and Fildes jar and incubated for 24–48 hours; the tube in which bacteriostatic action is complete is then noted. The bacteriostatic effects of the remedies are given in table I; the dilutions are expressed as direct dilutions.

Bacteriostatic action as a rule bears some relation to chemotherapeutic action, but this is not necessarily so because at times a substance with high bacteriostatic action, such as notatin, apparently has little or no chemotherapeutic power.

TABLE I—BACTERIOSTATIC ACTION

—	Dilution giving complete bacteriostasis		
	Cl. welchii	*Cl. œdematiens*	*Cl. septicum*
Sulphanilamide	1/400	1/500	1/2900
Sulphathiazole	1/800	1/1000	1/102,000
5-aminoacridine hydrochloride	1/160,000	1/640,000	1/640,000
2 : 7-diamino-acridine hydrochloride	1/80,000	1/640,000	1/640,000
2 : 8-diamino-acridine sulphate	1/160,000	1/640,000	1/640,000
Penicillin	1/250,000	1/500,000	1/500,000
Notatin	1/1,000,000,000	1/1,000,000,000	1/1,000,000,000
Propamidine	1/320,000	1/40,000,000	1/320,000

TOXICITY

The toxicity tests are carried out on mice by the ordinary procedure. A certain quantity of the drug in milligrammes is weighed out, dissolved or suspended in saline, and increasing doses of it injected into the thigh, the local and general toxic effects being noted. Comparisons are then made with the therapeutic dose.

General toxic effect.—Our experience of the general toxicity in mice of the therapeutic acridines is in general agreement with the findings of Albert and others (1938) and of Rubbo, Albert and Maxwell (1942). The therapeutic dose we have employed in mice (0·5 mg.) is about ¼ of the maximum tolerated dose of proflavine or about ½ of the L 50% dose. The margin was slightly greater with 2 : 7-diaminoacridine and rather less with 5-aminoacridine. With the sulphonamides (40 mg.) the margin was about the same, and with penicillin very much greater.

Local effect.—Proflavine and 2 : 7-diaminoacridine in therapeutic doses produced little or no local effect, whereas 5-aminoacridine caused some local inflammatory reaction. The sulphonamides caused little or no reaction and penicillin had no local effect.†

THERAPEUTIC ACTION

Method of testing.—In table II the layout of an experiment and the method of estimating the relative value of drugs is demonstrated. The mice are injected intramuscularly in the right thigh with 0·2 c.cm. of washed organisms suspended in a solution of 2·5% calcium chloride. Washing is necessary to remove any toxin. The dose of micro-organisms is standardised so that it contains 100 lethal doses; that is usually about 400 million in the case of *Cl. welchii* and *Cl. œdematiens* and 100,000 for *Cl. septicum*, as measured by standard opacity tubes for *Bacterium coli* which give comparable figures. The drug to be tested is injected an hour later in solution or suspension in quantities of 0·1 or 0·2 c.cm. at the same site as the infecting injection. The strains of clostridia employed were: *Cl. welchii* BSI No. 186 and S 107 supplied by Miss Robertson; *Cl. septicum* BSI strain 84; and *Cl. œdematiens* Jolly and HI. *Cl. welchii* BSI No. 186 and *Cl. œdematiens* HI are recently isolated strains from cases of gas gangrene.

We chose the interval of an hour because by that time the infection has developed, as shown by the presence of considerable œdema. Histological examination has

* This work was done on behalf of the War Wounds Committee of the Medical Research Council.

† There has lately been some criticism of the use of the acridine series of drugs in the treatment of wounds, on account of their tendency to produce local necrotic action and delay in healing. Our observations however have clearly shown that in the doses recommended such untoward effects are at a minimum and certainly no more severe than that of some other compounds now in use. We hope to publish shortly a detailed account of our observations on the toxicity of these drugs.

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confirmed this and has shown that the bacteria have invaded the muscle. At this time the infection is still relatively local since organisms cannot be recovered from the blood-stream till after 3 hours.

In the estimation of the chemotherapeutic value the average survival-rate of the mice in a 3-day period was used. The figure is obtained by dividing the total number of whole days survived in each group of mice by the number of mice in the group (Whitby 1937). The mortality for only 3 days is considered because mice living beyond this period usually survive indefinitely. Thus the maximum or complete survival figure would be 3·0, and this figure is occasionally reached. A typical result of a test is given in table II.

TABLE II—LOCAL TREATMENT OF *Cl. welchii* (S107) INFECTION IN MICE

Infecting dose: 0·1 c.cm. washed suspension of *Cl. welchii* + 0·1 c.cm. 5% CaCl, intramuscularly in right thigh.
Treatment: 0·1 or 0·2 c.cm. of solution or suspension of drug injected at same site 1 hour after infection.

TREATED MICE (400 million *Cl. welchii*)	No. of mice	Deaths on day			Survivors at		Av. no. of days survived * at 3 days
		1	2	3	3 days	7 days	
Penicillin, 34 units ..	6	1	1	0	4	3	2·2
2 : 8-diaminoacridine (proflavine), 0·5 mg.	6	2	3	1	0	0	0·8
2 : 7-diaminoacridine, 0·5 mg.	6	4	0	0	2	2	1·0
5-aminoacridine 0·5 mg.	6	2	1	0	3	2	1·7
Sulphathiazole 40 mg.	6	6	..	..	0	0	0
CONTROL MICE							
400 million *Cl. welchii*	6	6	..	..	0	0	0
40 ,, ,,	4	4	..	..	0	0	0
4 ,, ,,	4	2	1	1	0	0	0·75

* The average number of days survived is obtained by dividing the total number of whole days survived by the number of mice in the group.

Results.—The results of our tests on the three chief causative agents in gas gangrene are summarised in tables III and IV. These tables show that as good an estimate was obtained at the end of 3 days as at the end of 7, since the majority of mice surviving for 3 days survived indefinitely.

TABLE III—EFFECT OF LOCAL TREATMENT 1 HOUR AFTER INFECTION IN MICE

Treatment	No. of expts.	No. of mice	Per cent. survivors at		Av. no. of days survived at 3 days
			3 days	7 days	
Cl. welchii INFECTION					
Sulphanilamide 40 mg. ..	3	30	23	17	0·8
Sulphathiazole 40 mg. ..	5	30	3	3	0·3
Sulphadiazine 40 mg.	1	6	0	0	0·3
2 : 8-diaminoacridine (proflavine) 0·5 mg. ..	10	78	44	38	1·6
2 : 7-diaminoacridine 0·5 mg. ..	4	24	58	50	1·9
5-aminoacridine 0·5 mg. ..	4	24	50	46	1·7
Penicillin 34 units	5	36	86	78	2·7
Propamidine 0·5 mg.	4	22	14	14	0·8
Notatin 0·02 mg.	2	12	0	0	0
Nil	14	104	0	0	0
Cl. septicum INFECTION					
Sulphathiazole 40 mg. ..	3	18	78	72	2·7
Sulphathiazole 10 mg. ..	2	12	50	33	2·2
Sulphadiazine 10 mg. ..	1	6	17	17	0·8
2 : 8-diaminoacridine 0·5 mg.	2	12	0	0	0·9
2 : 7-diaminoacridine 0·5 mg.	1	6	17	0	1·3
5-aminoacridine 0·5 mg. ..	2	12	25	0	1·8
Penicillin 34 units	2	12	17	0	1·4
Propamidine 0·5 mg. ..	3	18	0	0	0·3
Notatin 0·02 mg.	2	12	0	0	0
Nil	5	30	0	0	0
Cl. œdematiens INFECTION					
Sulphathiazole 40 mg. ..	4	24	0	0	0·25
Sulphadiazine 40 mg. ..	2	12	0	0	0·3
2 : 8-diaminoacridine 0·5 mg.	2	12	0	0	1·1
5-aminoacridine 0·5 mg. ..	4	24	0	0	1·2
Penicillin 34 units	4	24	0	0	1·3
Propamidine 0·5 mg. ..	2	12	0	0	0·8
Nil	4	24	0	0	0

TABLE IV—SUMMARY OF CHEMOTHERAPEUTIC EFFECTS OF THE THREE MOST ACTIVE SUBSTANCES

Treatment 1 hr. after infection	Av. no. of days survived at 3 days		
	Cl. welchii	*Cl. septicum*	*Cl. œdematiens*
Sulphathiazole ..	0·3	2·7	0·2
Acridines	1·7	1·4	1·1
Penicillin	2·7	1·4	1·3

EFFECTS OF MIXTURES OF SULPHATHIAZOLE AND 5-AMINOACRIDINE ON *Cl. welchii* AND *Cl. septicum* INFECTIONS

Tests were then made with various mixtures of the more active chemotherapeutic remedies, to determine whether there was any interference with their individual therapeutic action. In the first experiment (table V), 5-aminoacridine and sulphathiazole were used because 5-aminoacridine was more active than proflavine on *Cl. welchii*, and sulphathiazole most active on *Cl. septicum*. The doses of drug used here were a quarter of those usually employed, so that evidence of synergism might be obtained, and each group consisted of 6 mice. In the second experiment (table V), a dry mixture of 99 parts of sulphathiazole and 1 part of 5-aminoacridine prepared by Mr. F. A. Robinson was used, of which the dose injected corresponded to sulphathiazole 40 mg. and 5-aminoacridine 0·4 mg. The two experiments show that there was no interference with the individual therapeutic action of the two drugs. A synergic action was shown against *Cl. septicum*, in which infection both drugs are highly effective; against *Cl. welchii* there was no evidence of synergism, probably because sulphathiazole, in the doses used, has little effect.

TABLE V—EFFECTS OF MIXTURES OF SULPHATHIAZOLE AND 5-AMINOACRIDINE ON *Cl. welchii* AND *Cl. septicum* INFECTIONS IN MICE

Treatment at 1 hr.	Av. no. of days survived at 3 days			
	Expt. 1		Expt. 2	
	Cl. welchii	*Cl. septicum*	*Cl. welchii*	*Cl. septicum*
5-aminoacridine and sulphathiazole ..	0·8	2·5	1·2	3·0
5-aminoacridine ..	0·8	0·7	1·7	1·7
Sulphathiazole ..	0·2	1·8	0·2	2·3
Nil	0	0	0	0

Doses of drugs: Each group consisted of 6 mice.
Expt. 1: 5-aminoacridine 0·1 mg., sulphathiazole 10 mg.
Expt. 2: 5-aminoacridine 0·4 mg., sulphathiazole 40 mg.

DISCUSSION

The discrepancy between the experimental and field results in the chemotherapy of gas gangrene seems largely due to the fact that most of the experimental anaerobic infections used as tests are not severe enough to be comparable with the disease in man; thus the chemotherapeutic remedies are made to appear much more effective than they really are. In the present tests we have tried to overcome this by devising a standard severe infection in mice. The disease is produced by the intramuscular injection of 100 minimal doses of the bacteria with calcium chloride as a stimulant, followed an hour later in the same site by an injection of the chemotherapeutic drug under test. This interval of an hour does give consistent results with repeated tests.

The results show that good effects may be hoped for by the local application of a chemotherapeutic drug while the disease is in an early stage. The test we have used might be more aptly described as a prophylactic one. Owing to the rapidity with which gas gangrene spreads the value of local treatment becomes restricted, and general treatment, including antitoxins, is then essential.

Since no one drug appears to be equally active against the three common pathogenic anaerobes found in gas

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gangrene the best results are likely to be achieved with a mixture of drugs. Our experience suggests that the most effective mixture would be penicillin and sulphathiazole, but while penicillin is not available in quantity we would suggest a mixture of sulphathiazole and an acridine. The acridine we would suggest is proflavine, since it is of low toxicity and very slightly inferior in its action to the other two acridines; it is easily prepared and can be obtained in large amounts. For the early treatment of war wounds in general we suggest the local application of a mixed powder of these two drugs in the proportion of 100 parts sulphathiazole to 1 part of proflavine, using the dosage recommended for sulphathiazole. In actual cases of gas gangrene this local treatment should be supplemented by antitoxin therapy and other general measures..

These drugs of course may be applied suspended in a vehicle, but our experience with vehicles so far recommended is that those which are likely to remain in situ for any length of time are toxic, producing various degrees of local necrosis or considerable foreign-body reaction. There is therefore a danger that the use of vehicles may give rise to unsatisfactory conditions for wound healing. These objections however do not apply to the use of drug-containing vehicles in the field as emergency dressings for superficial injuries or burns. A vehicle which we have found generally satisfactory for this purpose is composed of gum acacia 20%, glycerin 10%, gelatin 1·75% and castor oil 5% in water. In no instance however should the mixture be applied to the brain or nerve tissue.

We have also attempted to evaluate the relationship of the more active chemotherapeutic drugs to serum therapy on the lines of Henderson and Gorer (1940). The effect of antitoxin on this type of infection is irregular but we have found that during the early stages of infection greater therapeutic effect could be got by combining the drug and antitoxin than by either alone. Experiments are now in hand to determine the effects of combined treatment in the more advanced stages of the disease.

SUMMARY

A reliable technique for testing the comparative value of chemotherapeutic remedies on anaerobic infections in mice has been described.

In the doses used the most effective chemotherapeutic substances against the individual infections were penicillin against *Cl. welchii* and *Cl. œdematiens*, and sulphathiazole against *Cl. septicum*. The acridines possess a fairly powerful action against all three anaerobes, though in a lower degree. Propamidine had a lower activity against all three organisms, though its individual action in the case of *Cl. welchii* and *Cl. œdematiens* compared favourably with the sulphonamides.

The tests show that the anaerobes of gas gangrene are variable in their individual susceptibility to chemotherapeutic agents, in that as a rule no one drug is equally active against the three common anaerobes responsible for gas gangrene (*Cl. welchii*, *Cl. septicum* and *Cl. œdematiens*). The best prophylactic results are therefore most likely to be achieved by the use of a mixture of drugs and our experience suggests the local application of a mixture of sulphathiazole and proflavine. We further recommend that the use of vehicles should be confined to superficial application.

Treatment in the more advanced stages of the disease is difficult and requires additional measures and the use of antitoxins.

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ULSTER DOCTORS IN THE SERVICES.—Three out of every four men who have qualified for the medical profession in Northern Ireland since 1938 have volunteered for the medical branches of the Fighting Services. Almost all of them enlisted immediately on completing their statutory six months residence in a hospital. So many members of the medical staffs of the Ulster voluntary hospitals have joined up that it has been possible to carry on the work only by bringing back from retirement senior members of the staffs.

HYDATID DISEASE IN WALES

H. R. I. WOLFE, MB LOND, FRCS

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IN England hydatid disease is generally accepted as rare, but I assisted in the treatment of 10 new and 1 recurrent case in the Royal Infirmary, Cardiff, between 1936 and 1938. This experience suggested that the disease is more prevalent in Wales than elsewhere in the British Isles. I was unable to find support in published work for this view, but in the records of the hospital I found that 34 patients had been treated from 1926 to 1938. Reports of only 4 of these have been previously published. Tables I and II give evidence of the comparatively high incidence of the condition in Wales.

The figures are of course small in comparison with those of countries where sheep-rearing is a prominent industry, but they show that diagnosis is difficult and manifestations protean in a disease previously supposed so rare, and probably often overlooked. The prevalence of the disease in Wales demands measures to stamp it out.

TABLE I—INCIDENCE OF HYDATID DISEASE IN ENGLAND, SCOTLAND AND WALES FROM 1931 TO 1935 INCLUSIVE

Country	Population	Deaths from hydatid disease	Deaths per head of population
England ..	38,322,120	103	1 : 372,000
Scotland ..	4,966,300	2	1 : 2,483,000
Wales ..	2,526,880	35	1 : 72,000

Compiled from the Registrar-General's statistical review for England and Wales and from Scottish figures supplied by Dr P. L. McKinlay.

TABLE II—CASES OF HYDATID DISEASE TREATED IN SOUTH WALES (90 CASES) AND IN THE LONDON TEACHING HOSPITALS (28 CASES)

Hospital	Beds	Period reviewed (yr)	Cases of hydatid disease admitted
SOUTH WALES			
Cardiff Royal Infirmary ..	380	14	34
Swansea General	336	13	17
Hospitals of Welsh National Memorial Assoc. ..	..	13	25
Royal Gwent, Newport ..	210	8	10
Merthyr General	123	13	4
LONDON			
St. Thomas's	682	12	9*
London Hospital	849	9	10**
Guy's	692	10	9

* 2 cases were from New Zealand. ** Diagnosis doubtful in 1 case. Between 1926 and 1936 only one case of hydatid disease was admitted to a local hospital in a county adjacent to Wales.

That it is preventable is clear, for hydatid disease is now very rare in Iceland (Sambon 1925), and there is also evidence to show that it is diminishing in Australia (Kneebone 1938). Control of the number of dogs, stringent regulations concerning the disposal of offal, and education of the public have led to a decrease in the incidence in Shetland where it was once fairly common (Lawson Dick 1938). There is no reason to doubt that a similar satisfactory result can be achieved in Wales by adopting appropriate measures.

EPIDEMIOLOGY

Source of infection.—Dogs are undoubtedly the chief source of human infection. They become infested by feeding on the offal of infected sheep. In some districts in South Wales offal from ineffectively supervised abattoirs is either thrown on refuse heaps or sold for manure, and no provision is made to prevent dogs

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TABLE III—INCIDENCE OF HYDATID DISEASE IN SHEEP, PIGS AND OTHER BEASTS KILLED IN THE ROATH ABATTOIR, CARDIFF, IN THREE YEARS

Animal	Number killed	Number in which cysts were found
Sheep	95,085	486
Pigs	67,971	44
Other beasts, including oxen	14,583	141

getting at it. Cysts were found in 0·5% of the sheep killed in the Roath abattoir, Cardiff, in the three-year period 1934–36 (table III). Some of these cysts were submitted for pathological investigation and every one was identified as echinococcal.

Veterinary surgeons differ as to the percentage of dogs infested. It is probably not high, since the incidence of infection in sheep is low. The close proximity of grazing land in Wales to densely populated mining villages makes it easy for dogs to foul kitchen gardens with their excreta. Since the dog's coat and muzzle may be contaminated, fondling of animals by those in contact with them may be a ready means of transmission. It has been impossible to determine accurately the path of infection in the Royal Infirmary patients, but the histories obtained from 27 of them strongly suggest direct contagion; 9 had a history of close association with dogs, 3 were fond of watercress and lettuce and 10 admitted both factors; 5 denied both factors.

Age incidence and duration of infection.—The age at which the patient sought treatment is no criterion of the age of the infection, which is usually great. The age of the cyst may be inferred from multivesiculation, sterility, calcification or complications of the cyst. Occasionally a history of symptoms extends over many years—a man with a hepatic cyst was aware of the tumour for 25 years, a steel worker with cerebral cysts had fits over 8 years—but such long histories are unusual. It seems probable that infection is acquired during childhood or in early adult life. The degree of incapacity can therefore be regarded as slight, seeing that in spite of the

TABLE IV—AGE AT WHICH TREATMENT WAS SOUGHT AND DURATION OF SYMPTOMS IN 34 PATIENTS

Age	Cases	No symptoms	Duration of symptoms						
			Under 24 hr	Under 4 wk	Under 6 mth	1–5 yr	Over 6 yr	Min.	Max.
Under 20	7	..	..	2	5	..	..	2 wk	4 mth
21–40	14	1	1	..	4	6	2	20 hr	8 yr
41–60	10	1	1	1	3	3	1	17 hr	12 yr
Over 60	3	..	..	1	..	1	1	2 wk	10 yr

age of a cyst symptoms are of comparatively short duration (table IV) and patients are able to lead a relatively normal life.

MANIFESTATIONS

The first manifestation of hydatid disease is often ill defined. It depends on the site of the cyst, or on complications associated with its rupture; occasionally the condition is symptomless and discovered only at autopsy. The distribution of the primary cyst in this series is shown in table V. The commonness of cysts in the liver and the lungs accord with previously published figures. Brain cysts, usually solitary (Dew 1934), seem to be rare even in countries where the disease is common, for Barnett's figures from the Australasian Hydatid Registry show that only 5 of 428 patients had brain cysts. I have found only 2 references to the condition in this country (Caley 1903, Fleming and Burg 1919) and one of these was a report of an infection contracted abroad. The single case in this series of 34 shows 2 univesicular primary cysts in the frontal lobe and was reported by Langmaid and Rogers (1940). There are two specimens (one of which is shown in fig. 1) more than 15 years old of solitary cerebral cysts in the museum of the Welsh National School of Medicine, but no record of either is available. In 5 patients secondary cysts were recorded; in each a primary liver cyst gave rise to secondary peritoneal cysts, such as that shown in fig. 2.

Symptoms of primary cysts.—Most primary liver cysts had reached a considerable size before producing symptoms; some in children were diagnosed by the presence of a tumour before symptoms arose. Pain was experienced both by older children and by adults but was in no way characteristic. It was described as a dull ache, or as sharp and stabbing; only rarely was it colicky or accompanied by nausea or vomiting. Jaundice due to the pressure of the cyst was noted in 3 cases.

Lung cysts also grow to a large size before producing symptoms. One patient with two large intrathoracic cysts and multiple liver cysts had no symptoms referable to the chest, but another with a large cyst at the base of the right lung complained of epigastric pain. Cough

TABLE V—ANATOMICAL DISTRIBUTION OF CYSTS IN 34 CASES

Site	Cases	Position
Liver ..	27	Right lobe 16; left lobe 3; between lobes 2. Multiple cysts 6. Most were on antero-inferior or postero-inferior surface.
Lung ..	5	Right lower lobe 4; left lower lobe 1.
Spleen ..	1	Lower pole.
Muscles and cellular tissue	1	Abdominal wall, left hypochondrium.
Brain ..	1	Left frontal lobe.
Extradural ..	1	Spinal cord, level of 6th dorsal vertebra.

One case had cysts in the liver and the lungs and another a cyst in the liver and in the spleen.

and hæmoptysis, presumably due to erosion of a bronchus, brought 4 of the 5 patients under observation, but in each the history was comparatively short. The X-ray findings in a case of bilateral lung cysts are shown in fig. 3.

Pressure effects were in the central nervous system the cause of symptoms in 2 cases. In one, an extradural cyst of the spinal cord, signs were of short duration and rapidly progressive; 4 months after the onset of paresis the patient, who was 10 years old, had a spastic paraplegia and was anæsthetic to the level of the 9th dorsal vertebra. The history of the other patient, aged 21, who had two cysts in the left frontal lobe, was more vague and the progress more insidious. He had fits over 8 years, but undoubted signs of increased intracranial pressure (the chief of which was a rapidly increasing papilloedema) were manifest only in the last 3 months. Separation of the cranial sutures was demonstrated by X rays (Langmaid and Rogers 1940).

There is one example of a primary splenic cyst in the series. The patient complained of pain and of a tumour in the left side of his abdomen for 2 months, and had bulging of the ribs and a palpable mass below the left costal margin. Symptoms due to anaphylaxis were not observed in any case, nor was a history obtained of any attacks which could be ascribed to this.

Fig. 1—Univesicular cerebral hydatid cyst.

Symptoms of secondary cysts.—There were 2 cases in which symptoms were due to secondary cysts. In one, fatal intestinal obstruction was caused by an omental band adherent to a pelvic cyst; in the other labour was obstructed by a large cyst in the pouch of Douglas (Embrey 1938).

Multivesiculation.—Tendency to multivesiculation appears to increase with age. Of 27 liver cysts examined, 16 were recorded as multivesicular,

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only 4 (all in children) as univesicular. The tendency to multivesiculation is less evident in lung cysts; of 5 treated all were univesicular. Multivesiculation in primary brain cysts is unusual, and in the only cases recorded there has been an antecedent history of trauma. Such a history was obtained in the patient admitted to our unit but the two cysts were nevertheless univesicular.

Complications.—Liver-cyst complications were rupture into the biliary passages, intraperitoneal rupture, calcification and suppuration. Rupture into the biliary passages was seen in 6 patients. In 1 the right hepatic duct was eroded, in the other 5 smaller biliary radicals only were affected. Rupture into the peritoneal cavity, or into the extraperitoneal cellular tissue was observed in 5 patients; in 2 secondary cysts were found extraperitoneally, in 3 intraperitoneally. In these last 3, the primary cyst was in the right lobe of the liver, and secondary cysts were scattered round the cæcum, the ascending colon, and in the pelvis. Calcified cysts were found in 4 patients. Suppuration was found in 3, 2 of whom developed a subphrenic abscess; 1 of these had multiple calcified liver cysts (fig. 4). The lung cysts, with the exception of one case of pleural effusion, were free from complications, as also were those cysts recorded in other sites.

Jaundice.—During some period of their illness 7 patients were jaundiced. The biliary obstruction was due to:

1. Elimination of daughter cysts and hydatid debris along the ducts, 2 patients. In one, the right hepatic duct was eroded and daughter cysts were being discharged along it; the gall-bladder, stomach and small bowel contained a number of them. In the other the ætiology was obscure. The patient had had periodic attacks of jaundice for 4 years before admission, and after removal of the cyst a biliary fistula developed which took 6 months to heal. So persistent a fistula coupled with the previous history seems to indicate that a large duct was eroded and that elimination had previously taken place along this channel.

2. Compression of the ducts, or their distortion due to the size of the cyst, 3 patients. In the first the common bile-duct was distorted and compressed by a large retroperitoneal cyst, in the second the cyst was in the portal fissure, in the third a large cyst was found in the right lobe of the liver with no obvious communication with the biliary passages.

3. Infective cholangitis, 2 patients. The first, who was jaundiced for 3 weeks, had an infected cyst in the left lobe of the liver; the second, jaundiced for 2 weeks, had an infected cyst in the right lobe of the liver.

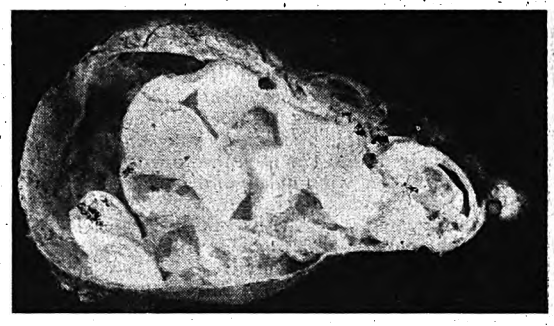

Fig. 2—Univesicular secondary intraperitoneal hydatid cyst.

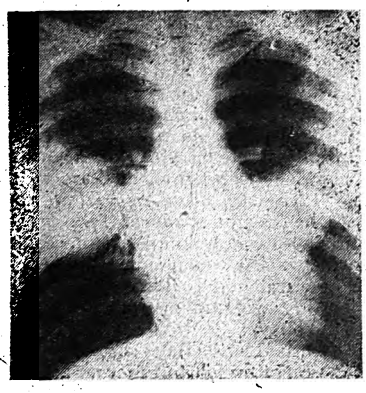

Fig. 3—Anteroposterior view of the chest showing bilateral hydatid cysts of the lung and mediastinal cysts.

Fig. 4—Multiple hydatid cysts of the liver. The dense deposit of calcium salts in the adventitia casts an unmistakable shadow.

Fig. 5—Multivesicular hydatid cyst in the right lobe of the liver with another cyst full of inspissated bile lying above and internal to it. The hæmorrhage into the adventitia following attempted dissection in this layer can be seen.

DIAGNOSIS AND TREATMENT

The correct diagnosis was made clinically in 18 patients. In most patients with liver cysts and in the one case with a cyst in the spleen the shape of the tumour gave a clue. It was described as being either round or oval with a smooth surface. The consistence varied; some were hard, others soft and fluctuant, but in none was a hydatid thrill noted. In a minority of liver cysts the tumour was indefinite, and diagnosis was made by X rays and serological investigations. In the lung cysts, X rays suggested hydatid disease, and the diagnosis was confirmed by serological and hæmatological tests, those employed being the Cassoni intradermal test, the hydatid complement-fixation test, and the differential leucocyte count. The diagnosis was missed in 16 patients. In 10 it was made at operation, in 6 at autopsy. Some patients were so ill on admission they were not submitted to any special investigation; others died of intercurrent infection. The idea that the disease is very uncommon causes errors in diagnosis because it is unsuspected. In Wales the diagnosis should always be kept in mind and doubtful cases appropriately investigated.

Of the 34 patients, 27 were treated surgically, with results shown in table VI.

The two-stage operation for liver cysts was performed once.—In this operation adhesions between the cyst and the abdominal wall are promoted by an iodine pack. A few days later the cyst is opened and the contents and membrane removed. Convalescence was marred in this case by a biliary fistula which took 4 months to heal. The patient was well and showed no signs of recurrence 2 years later.

A one-stage operation, in which the cyst was opened without first promoting adhesions, was performed on 13 patients, of whom 11 recovered and 2 died of primary hæmorrhage. The hæmorrhage was due in the one case to an incision in the liver to expose the cyst, in the other (fig. 5) to attempted dissection in the adventitia. The methods of dealing with the cavity in the 11 patients who recovered were as follows. In 4 it was drained; 2 of these had a temporary biliary fistula. In a follow up 2 of the drained cases had had no recurrence after 12 and 6 years; 2 could not be traced. One was readmitted 3 years after her operation with a large retroperitoneal cyst; this was drained and she was discharged 2 months later; her subsequent history is unknown. In 3 cases the cavity was closed with mattress (1 of these had a biliary fistula for a time) and in 2 with continuous sutures; one of these had a postoperative hæmatemesis. In a follow up, 3 of the closed cases had had no recurrence in 13, 8 and 7 years; 2 could not be traced. In the remaining 2 cases the cyst was marsupialised; both of these had a temporary biliary fistula. One of the marsupialised cases could not be traced

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later; the other had a recurrence in the liver at the site of the original cyst 3 years after operation, but it was causing no symptoms and she refused treatment.

Multiple liver cysts were treated in 2 girls aged 9 and 2½ years. In the first, two operations were performed in 3 weeks (fig. 6). All cysts except G were on the anterior surface of the liver. At the first operation cysts A, B and C were aspirated and incised, and the membrane was removed; the cavities were swabbed with eusol and closed. Cyst D was aspirated. At the second operation, 3 weeks later, cysts A and C had disappeared; cyst B had refilled with clear brown fluid containing scolices, and was reaspirated. Cyst D was aspirated again and eusol injected. Cyst E was aspirated and incised, and the membrane was removed; the cavity was swabbed with eusol. Cysts F and H were aspirated and eusol injected. An attempt to remove cyst G had to be given up because the pleura was damaged in the course of rib resection; the cyst was aspirated. Convalescence was uneventful but nothing further is known of this patient. The second had multiple liver cysts and two in the base of the right lung. At laparotomy two of the cysts were aspirated and formalin injected. The child became extremely shocked and died shortly afterwards.

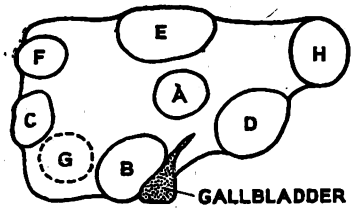

Fig. 6—Diagram showing sites of cysts in the liver of a girl aged 9.

Two patients with *infected cysts* were treated surgically. In the first, a large subphrenic abscess was drained, but the patient died of general peritonitis. In the second, a subphrenic abscess pointing in the right hypochondrium was drained through a stab incision. She recovered but died of unknown causes 7 months after leaving hospital.

Lung cysts were treated in 4 cases; one with a cyst in the left lower lobe and one with two cysts in the right lower lobe were treated by primary lobectomy and an easy convalescence followed operation (d'Abreu 1937, 1938). They are alive and well with no signs of recurrence 2 years later. A two-stage operation was performed in the other 2 patients; one died of acute fibrinopurulent pericarditis a month after the second operation; the other expelled the cyst spontaneously 9 days after the first operation. After it was sure that no remnants of the cyst were left, treatment was by formalising the cavity.

Of the 2 patients with *cysts of the central nervous system*, one was found on laminectomy to have an extradural cyst of the cord at the level of the sixth dorsal vertebra. This was removed from the meninges and convalescence was uneventful; there was complete recovery of power and sensation in the lower limbs in 3 months. He was readmitted 6 years later with a history of a gradually increasing kyphosis and of loss of power and of diminished sensation in the lower limbs. The laminæ of the 3rd and 4th dorsal vertebræ were removed and the scar tissue of the previous wound excised. A mass of hydatids was found which seemed to arise in the borders of the vertebræ and to extend into the spinal canal medially and the pleural cavity laterally. The cysts were removed and the cavity swabbed with formalin. The pleural cavity was inadvertently opened but was quickly plugged with gauze soaked in formalin. He bore the operation well, but subsequently developed a pleural effusion which cleared up on aspiration. The cord condition showed no signs of improvement and was re-explored 7 months later. The dura was very much thickened, and there were dense adhesions between it and the cord, which was not pulsating below the level of the 4th dorsal vertebra. The adhesions were carefully divided and the cord freed. The operation was well tolerated but he developed pyæmia and died.

The other patient had two cysts in the left frontal lobe. When an osteoplastic flap was raised over this area the dura was found to be tense and congested. An attempt was made to tap the lateral ventricle through a small incision and at a depth of 2 cm. a quantity of limpid fluid was discharged under great pressure. This was allowed to escape slowly and the dura then widely opened. The cerebral cortex, thin and collapsed, was incised and an hydatid cyst, which had been punctured by the brain needle, found. The membrane, which separated with ease from the surrounding cerebral tissue, was removed with a teaspoon, and another cyst was found lying anteriorly to the first. This very delicate cyst burst in the course of manipulation, but the membrane was removed.

TABLE VI—RESULTS IN 27 PATIENTS TREATED SURGICALLY

Total cases in age-groups	Site of cysts	Cases treated surgically: Cases	Recovered	Recurred	No recurrence	Died	Untraced	Period (yr)	Remarks
Under 20 yr. (4 M, 3 F)	Liver	4	3	..	1	1	2	13	—
	Lung	1*	1	0	1	0	0	2	—
	Spleen	1	0	0	0	1	0	..	Died 3 days after op.
	Extra-dural	1	0	1	0	1	0	..	Died 8 yr after 1st op.
20–40 (3 M, 9 F)	Liver	8	8	..	4	..	4	12,8, 7, 6	
	Lung	2	1	0	1	1	0	½	
	Brain	1†	0	..	..	1	0	..	
	Perito-neum	1‡	1	..	..	0	0	..	Awaiting readmission.
40–60 (4 M, 3 F)	Liver	5	2	1	1	3	0	4, 2	1 recurred after 3 yr.
	Lung	1§	1	0	1	0	0	3	—
	Perito-neum	1	0	0	0	1	0	0	Died of peritonitis 2 days after op.
Over 60 (1 F)	Liver	1	1	0	0	0	0	0	Died of unknown causes 7 mth later.

* d'Abreu 1938. † Langmaid and Rogers 1940. ‡ Embrey 1938. § d'Abreu 1937.

As the cavity of the pericyst did not communicate with the lateral ventricles it was irrigated, and then swabbed with gauze soaked in formalin. The cavity was drained with a glove drain, the dura tightly sutured, and the scalp closed in two layers. Six hours after operation the patient developed auricular fibrillation which lasted an hour and was followed by sinus arrhythmia. He did well till the 10th day, by which time there was considerable return of power in the right arm. Vision had improved and the papillœdema was much less. The wound healed by first intention except anteriorly where there was a continuous and copious discharge of bloodstained cerebrospinal fluid. On the 12th day after operation his condition began to deteriorate, he became stuporose, the temperature rose to 101° F., and there was a small hæmorrhage from the wound. The following day he was in coma; he had a severe secondary hæmorrhage and had to have the point ligated. He died on the 14th day after operation, an extradural abscess being found at autopsy.

One patient with a *splenic cyst* died three days after aspiration of the cyst, removal of the membranes and marsupialisation of the cavity.

Of 2 patients with peritoneal cysts, one was admitted for obstructed labour; cæsarean section was performed and two peritoneal cysts removed (Embrey 1938). She now awaits readmission for treatment of a large cyst in the pouch of Douglas, and ten peritoneal cysts. The other patient had two peritoneal cysts enucleated, but died of peritonitis 2 days later. The right lobe of the liver was occupied by a large cyst which was discharging daughter cysts along the biliary passages.

Mortality.—Of the 34 cases here recorded, 16 died: 4 from complications of the cyst, 8 from postoperative complications, and 4 from intercurrent infection (tuberculous meningitis, cavernous sinus thrombosis, bronchopneumonia and erysipelas). The mortality was thus high, especially in patients over 40.

SUMMARY

Hydatid disease is shown to be more common in Wales than elsewhere in Great Britain.

In 34 cases treated at the Royal Infirmary, Cardiff, from 1926 to 1938, the age at the time of admission ranged between 2½ years and 68 years.

Just over half the cases were diagnosed before operation; it is thus important to bear the condition in mind and to make full use of the laboratory.

The mortality was 16 in the series of 34.

Treatment was too varied to justify definite conclusions. Though injection of 1–2% aqueous solution of formalin should be a routine in most cases it does not seem to be without danger when employed for cysts of the central nervous system.

Factors accounting for the high incidence in Wales are the ineffective supervision of abattoirs in some

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districts, and the lack of popular knowledge of how to avoid the disease.

I am indebted to Prof. Lambert Rogers and Prof. J. B. Duguid for helpful advice and criticism, and to all members of the staff of the Royal Infirmary whose cases are included in this review.

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BLAST, SUDDEN DEATH AND THE EPIGLOTTIS

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A MAN engaged in electrical repairs was found cyanosed and pulseless perhaps an hour after electrocution. I arrived after oxygen and artificial respiration, by Schafer's method and by my rocking method, had been tried for an hour unsuccessfully. I could detect no air-flow even with a finger in the pharynx. I tried vainly to insert a rubber tube into the larynx, and also tried a combination of my rocking method with chest compression. After a second hour's efforts I gave it up, greatly puzzled by my failure to establish an air-way. Post-mortem examination explained this, for I found that the epiglottis was sealed down tightly on the glottis. It fitted so closely that I could not lift it with my fingers but had to insert the point of a knife to do so. (A perfect fit is not accidental but implies a function—presumably protective.) The larynx looked normal. Small burns on the left mastoid and the right thumb showed that the current had taken an unusual course, and possibly this accounted for the surprising epiglottis, which may have become impacted by unnatural expirations, gasps or gulps.

I publish this case now, about six years later, because I believe that impaction of the epiglottis may be the explanation of sudden deaths from blast.

The high-pressure wave of blast, both in air and in water, compresses the thorax, expelling some air. The chest, being elastic, then expands, and air is drawn sharply inwards. This inrush of air, which I call the restitution wave, might slam down the epiglottis and its effect would be reinforced by the low-pressure wave, which sucks the walls of the thorax outwards, just as it sucks glass out of windows. The epiglottis might thus be fixed firmly in position, as in the electrocution case recorded above, and there might not be enough air in the lungs to expire it upwards again.

If this is the mechanism of death from blast, survival will depend on such details as whether, at the time of impact, the person has just filled or just emptied his lungs, whether his mouth or nares are open, whether his ribs are rigid or flexible, and whether his epiglottis is tilting downwards as it does in swallowing (Johnstone 1942).

OBJECTIONS

It may be argued, in the first place, that impaction of the epiglottis is a very rare if not imaginary occurrence. That this is not so is shown by an annotation, on the epiglottis in anæsthetic deaths, in the *British Medical Journal* (1942). Commenting on a paper by Caiger (1942) the annotation recalls that F. J. Palmer in the twenty years ending 1928 had many cases moribund from impaction of the epiglottis while under anæsthesia and revived them by digital reposition. (No-one believed him.) H. M. Wharry in 1927 recorded 3 cases saved in the same way. Caiger, who saw 8 cases in three years, said that if the epiglottis was not felt in its usual position he hooked it up with one finger laterally, thus saving lives. R. Saniter in 1932 preferred to grip the epiglottis with two fingers and lift it up with the base of the tongue.

Secondly, it will be said that if blast casualties die because their airway is blocked by an impacted epiglottis they should show signs of asphyxia—e.g., struggling and cyanosis. The following examples show that sudden complete blockage is not necessarily followed by such signs:—

Patterson (1942) records the deaths of 2 mental patients observed by the nursing staff. One was a woman of 40 who—having devoured her own bread and butter—was standing up and about to snatch her neighbour's. She was seen to slump into her seat and collapse, dying within 5 minutes. The other was a woman of 65 who turned pale and collapsed while eating bread and butter and died within 7 minutes. Cyanosis and the usual signs of choking were absent. In both cases bread was found impacted in pharynx, trachea and bronchi, as also in a third woman whose sudden death was not witnessed.

Taylor's *Medical Jurisprudence* (1894) describes the case of a man who rose from dinner, slumped against the wall, and died almost at once. The doctor who made the post-mortem examination missed the cause of death, which was a large piece of meat in the pharynx.

Taylor says that ecchymoses in the lungs and elsewhere are usual in asphyxia—as they are in blast and depth-charge deaths—but not invariable. All the post-mortem signs of asphyxia may be absent.

Another objection that may be raised is that if impaction of the epiglottis is really the cause of death in blast it would have been recognised before now. But the doctor who examined my case of electrocution at autopsy did not notice the impacted epiglottis, and the mechanism of death would have remained a mystery had I not observed it. How much more likely that the condition would be missed in the congested carnage of the post-blitz mortuary.

Zuckerman and his co-workers (Krohn et al. 1942) find that the blast pressure acts on the walls of the body of their experimental animals. "Closure of the glottis," they say, "is of no importance because the shock wave would have passed long before the vocal cords could begin to close . . . no appreciable amount of air could go up or down the trachea in the time." They do not mention the epiglottis and the possibility of its impaction by negative pressure.

While admiring their experiments I find unsatisfactory their conclusion that immediate death is due to shock. It fails to explain our main problem, well illustrated by the tragic case of Dr. W. and Dr. D., who were talking only a foot apart when a bomb dropped near them. Dr. W. tells me that he was thrown down by the blast but unharmed. His colleague was struck on the head by the swinging door beside him and was killed at once without physical injury and "not from the fractured skull." Dr. W. remembers feeling a catch in his breath which may or may not have been due to fright. If shock killed one, why not both? But one, if, for example, he had just completed expiration, might easily have had his epiglottis impacted fatally while the other felt only a catch in his breath. Similarly, Dr. W. tells me of people who were found in a shelter, after an explosion near by, dead though uninjured, sitting or lying without sign of struggle. To find one's lungs empty and be totally unable to inspire may well produce collapse, as in the three patients choked by bread.

Latner (1942) finds that a very brief but powerful negative pressure can produce sudden death in mice and similar hæmorrhagic lesions to those produced from blast by Zuckerman (1941). One of his surviving mice had symptoms which suggested (to my mind) the important possibility of gas bubbles being liberated in capillaries.

EXPERIMENTS

I have made a number of experiments (by exploding 1 lb. ammonal at 6 ft. distance) with models representing the thorax and epiglottis. My hypothesis must eventually be proved or disproved by post-mortem findings rather than by experiments, and I shall not describe them in detail. But they clearly demonstrated a final suction capable of slamming down the epiglottis.

1. An empty pint bottle was fitted with a rubber finger-stall whose end had been cut off. The projecting finger-stall was sucked into the bottle neck by the "restitution wave" which restores the air sucked out of a cavity.

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2. A cylindrical tin (4 × 2½ in.) was fitted with a close-fitting lid. The lid was sucked off and blown 12 in. *towards* the crater. This proved suction and disposed of a criticism that the finger-stall in the last model had been merely pushed in by the explosion. My own ear-drum suffered in probably a similar way, sustained deafness being caused.

3. The bottom of an Australian port bottle was removed and replaced by a taut diaphragm of rubber sheeting (thick or thin). This imitated the elasticity of the thorax whereas the model used in experiment 1 was too rigid. The finger-stall was always sucked in, and with such enhanced violence that it was always rent. The diaphragm had usually one to three small holes (portions missing) showing that rubber membranes—and presumably air-containing gut or lung would be affected in the same way—had no time to stretch in the brief (0·05 sec.) and violent suction wave but behaved almost as if rigid and non-elastic.

This last experiment accounts for the hæmorrhages and perforations found in victims of blast and depth-charges.

Although the rubber diaphragm was tied on tightly with string prolonged to the neck of the bottle it was always pulled down about ½ in. leaving it slack instead of taut. This is important in showing that the suction wave in the thorax is not merely an elastic recoil from the brief but violent pressure wave (0·003 sec.) but is a powerful suction which seems quite adequate to slam down the epiglottis and hold it there by the vacuum produced in the thorax. It must remain in this position unless the victim happens to have enough air in his chest to blow it open again.

PREVENTION AND CURE

The results of experiment 3 suggest that protection would perhaps be afforded by a broad abdominal belt (or bandage), which need not be very tight but must be inelastic. This is practicable, whereas protection against the positive wave is impracticable and probably unnecessary. The use of a tight inelastic bandage for the chest or jacket has already been recommended by Latner (1942).

If I am right in contending that the cause of death is impaction of the epiglottis, there should be a chance of cure by releasing the lethal vacuum in the thorax by plunging a small trocar or hollow needle into the trachea, possibly blowing into it also. If no needle (or knife) was available it might be possible to lift the epiglottis with the finger-nail or crochet-hook, especially if the thorax were strongly compressed at the same time. All must be completed within 4 minutes if the life is to be saved—unless perhaps by artificial respiration.

SUMMARY AND CONCLUSIONS

Impaction of the epiglottis is capable of causing immediate death.

Exposure to blast often causes deaths which have not been satisfactorily explained: there may be no sign of a lethal injury, and persons exposed to the same blast may escape unharmed.

It is suggested that in such cases death may be due to impaction of the epiglottis while the lungs are empty. The epiglottis cannot be disimpacted by expiration, for the chest does not contain enough air.

Positive evidence of impaction of the epiglottis should be diligently sought in blast victims, by digital exploration or by post-mortem examination. This evidence will not be found until it is specifically looked for.

If the above hypothesis is correct, death can be averted if the epiglottis is promptly replaced or if the vacuum holding it down is abolished by plunging a hollow needle into the trachea. Artificial respiration is futile till this is somehow effected.

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BILATERAL ADRENAL HÆMORRHAGE

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THE association of adrenal hæmorrhage with a fulminating septicæmia, nearly always meningococcal, has been described as the Waterhouse-Friderichsen syndrome. The significance of the clinical and post-mortem findings and their relation to peripheral vascular failure are not yet sufficiently appreciated. Since the original descriptions of Waterhouse (1911) and Friderichsen (1918) a number of cases have been reported—Aegerter in 1936 found 55 and added 2 more, and in 1937 Sacks found 64 and added 2. Grace and others (1940) reported 3 British cases, and records of single cases include those of Kamber (1937), Hughes (1940) and Fox (1942), and one of the cases of meningococcal encephalitis described by Banks and McCartney (1941). Two of the cases reviewed by Aegerter, 2 of the 5 reported by Craster and Simon (1938) and the case reported by Carey (1940) did not come to autopsy and the diagnosis remains doubtful.

The clinical manifestations are dramatic in their sudden onset and progress. In about 70% of cases the patient is under 2 years of age. The initial symptoms are restlessness, headache, or more often shifting abdominal discomfort, with vomiting and diarrhœa. The disease progresses rapidly, and the patient passes from restless delirium or convulsions to stupor, often with well-marked cyanosis. Petechial hæmorrhages which do not fade on pressure are found in most cases if the skin is carefully examined in a good light; sometimes they become confluent and the skin has a mottled livid appearance. In only a few of the reported cases has blood-culture or examination of the cerebrospinal fluid been of assistance. A few reports describe a leucocytosis, and in one case (Middleton and Duane 1929) the white-cell count was 88,500 per c.mm. The clinical notes of 3 cases coming to autopsy recently will illustrate the dramatic onset and course of the disease.

CASE-RECORDS

CASE 1.—A foster mother carried the dead body of a girl aged 4 months into the extern of a children's hospital at 8.30 AM. There was nothing to suggest neglect or maltreatment. The child was said to have been always healthy, and to have appeared entirely normal 12 hours earlier. She had had several screaming fits with drawing up of the legs around midnight, but after 3 AM she was believed to have been asleep until discovered dead and cold.

CASE 2.—A boy of 3½ years complained of abdominal pain on waking. Five weeks earlier he had had an operation for inguinal hernia and a fortnight after that had had measles. There was no abdominal tenderness and he did not complain of headache, but he vomited several times and rapidly became very ill and was admitted to hospital at 1.15 PM. His pulse-rate was 136 per min. and temperature 103·2° F., and it was thought that there was some neck-rigidity and a positive Kernig's sign. The cerebrospinal fluid was under pressure but clear; later it was found to be sterile and to contain no excess of protein or cells. An intramuscular injection of 0·5 g. of a sulphapyridine preparation was given, but the boy died an hour after admission.

CASE 3.—A girl aged 4 months vomited several times during the night, but it was only in the morning when a fine red rash appeared on the body that the parents thought her ill. A doctor who was summoned brought the child to hospital immediately. Her temperature was 102° F., the pulse could not be counted and respirations were about 90 to the min. There was well-marked cyanosis and a fine rash which became confluent in dependent parts to form larger, ill-defined and livid red areas. The child died an hour later.

AUTOPSY FINDINGS

In case 1 the autopsy was done within 12 hours of death, but in cases 2 and 3 the interval was 16 and 24 hours. The findings were essentially similar in all three cases, but careful examination in a good light was necessary to detect a fine red rash in the skin in cases 1 and 2. Case 2 alone showed macroscopic petechiæ apart from those in the skin; these were found in the serosa of the large and small intestine, in

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the gastric mucosa, and in the subendocardial tissue of the septal wall of the left ventricle. In all cases the serous cavities contained a slight excess of clear fluid, the brain, lungs and kidneys were grossly congested, and the liver and kidneys were swollen and bulged over the cut edge of their tense capsules. The thymus was much enlarged, especially in cases 1 and 3, but the lymph-glands of the mesentery and the malpighian corpuscles of the spleen were not unduly large. The spleen was not enlarged or obviously congested.

The loose retroperitoneal tissues of the posterior abdominal wall around the adrenals were in all cases extremely œdematous; this was obvious even before the peritoneum of the posterior abdominal wall was incised. The adrenals themselves were twice their normal size, but their shape was preserved. They were purple to dark red, and on section the hæmorrhagic appearance was fairly uniform throughout the glands. Only in a few small areas, about 2 mm. in diameter and best seen in case 2, was the structure of the cortex distinguishable. The medulla could not be recognised, but the glands showed no disruption of their structure by large confluent hæmorrhages.

Histological Examination.—All the lesions were acute and there was no complicating disease. In the heart the interstitial tissue was spread apart by œdema fluid and the capillary endothelium was prominent. A few swollen and rounded mononuclear cells, and in case 2 occasional foci of polymorphonuclear leucocytes, were lying in the interstitial tissue. In almost all the lung alveoli there was œdema fluid and in case 1 there was some fibrin. Red blood-cells had escaped from grossly congested capillaries and lay in alveoli, in the fibrous tissue septa and in the subpleural tissue. In case 2 polymorphonuclear leucocytes were present in great excess in the lumen of the small pulmonary vessels. There was cloudy swelling of the liver cells. In the spleen prominent aggregates of large mononuclear cells comprising the centres of the malpighian bodies occasionally showed necrosis, but the sinusoids contained no excess of red blood-cells. Red blood-cells lay tightly packed in the capillaries of the kidney, and, especially in case 1, there was sometimes rupture of small vessels both in the kidney and in its capsule. Congested capillaries, minute pericapillary hæmorrhages and occasional swelling of the capillary endothelial cells were found in the brain, especially of case 3. Small pericapillary hæmorrhages were demonstrated in the œdematous interstitial tissue in and around nearly every organ—pancreas, thyroid, aorta—and in case 2 in the submucosa of the stomach.

The most evident lesions were in the adrenals. Both cortex and medulla were, with the exception of a few small areas mainly in the zona glomerulosa, entirely destroyed by confluent extravasation of blood. Transitional stages were demonstrated, from distended capillaries and intact parenchyma to complete disruption of capillaries and mechanical separation of parenchymatous cells with well-preserved nuclei but indistinct cytoplasm. The proportion of white blood-cells was normal and there was no antemortem thrombosis. A feature was the well-marked œdema and the small hæmorrhages in the pericapsular tissue.

Bacteriology.—Attempts to demonstrate organisms by culture and by bacterial stains were unsuccessful. The meningococcus is rarely isolated 12 hours after death, and failure to isolate other organisms is more significant. Adrenal hæmorrhage has followed diphtheritic, pneumococcal and streptococcal infections, but, while the meningococcus has been recovered in less than half the reported cases, there is little doubt that the great majority are due to meningococcal infections.

DISCUSSION

Apart from the adrenal lesions these cases showed widespread œdema of the interstitial tissues, œdema fluid in the lung alveoli, sequestration of red blood-cells in dense aggregates in over-distended minute blood-vessels, and slight swelling of endothelial cells. Moon (1938) has described similar lesions not only in shock following trauma and burns but also in certain infections, such as gas gangrene, diphtheria, cholera and influenza. The lesions enable the morbid anatomist to recognise in these diverse conditions a common factor, which is an increasing and potentially fatal disparity between the blood-volume and the capacity of the vascular system. The occurrence of these lesions, essentially similar to those of surgical shock, is also inadequately recognised as the cause of death in many acute bacterial infections.

The minute hæmorrhages throughout the body, and the confluent hæmorrhages in the adrenals, can be attributed to rupture of over-distended capillaries damaged by bacterial toxins and by anoxæmia resulting from stasis. Capillaries often appeared blocked by closely packed aggregates of red cells such as would result from loss of plasma through damaged capillary walls. In these cases there was no evidence of capillary embolisation by bacteria or of the formation of small abscesses. Such lesions, definite thromboses, and hæmorrhage secondary to parenchymatous degeneration of the adrenal may complicate other and less acute cases (e.g., case 7 of Banks and McCartney), and adrenal hæmorrhage may occur in a variety of conditions, including bacterial toxæmias and burns (for references see Goldzieher 1939). Even in cases described as bilateral adrenal hæmorrhage every intermediate stage between minimal adrenal damage and destruction of the whole gland can be amply illustrated. In a recent autopsy on a boy of 14 years, ill for 18 hours with abdominal pain and vomiting, meningococci were recovered from the surface of the brain, and, while the findings in the other organs were essentially similar to those described above, only a few ruptured capillaries were found on microscopical examination of the adrenals.

In almost all the published cases the clinical and post-mortem findings have been ascribed to the adrenal lesions and various forms of treatment have been recommended on this assumption; thus, Aegerter (1936) recommended adrenal cortical extract, sodium chloride and adrenaline, and Grace and others (1940) recommended cortical extract and plasma transfusions. It is of course possible that the generalised structural changes which have been described are not the result of a generalised peripheral vascular failure produced by a bacterial toxæmia, but result from shock secondary to destruction of the adrenals by a disease process acting selectively on the adrenals. It must, however, be emphasised that the adrenal lesions are acute and progressive at the time of death, that they are variable in extent in different cases, and that animals survive total loss of adrenals for several days at least (see Grollman 1936). Normal involution in the newborn may leave little more cortical tissue than is present in some of these cases, and even when this involution leads to destructive hæmorrhage producing acute adrenal insufficiency of the newborn symptoms usually persist longer than 24 hours (Goldzieher 1939), although even here an associated toxæmia cannot be excluded. Reports suggest that adrenalectomised animals are hypersensitive to many drugs and toxic agents and succumb very readily to surgical shock. It may be that to combat shock greatly increased demands are made on vital reactions depending on continued adrenal secretion and that with destruction of the adrenals in these cases the symptoms and signs of shock advance more rapidly.

The well-marked leucocytosis, exemplified by the count of 88,500 per c.mm. reported by Middleton and Duane (1929) and by the large numbers of polymorphs in the pulmonary vessels in case 2, may be a response to a virulent bacterial infection, but its degree and rapidity of development suggest that it should be compared to the leucocytosis often found in shock resulting from a variety of conditions (Moon 1938, pp. 73, 175).

From the viewpoint of therapy this emphasis on the primary importance of peripheral vascular failure may be valuable. Treatment at the earliest possible moment with the powerful agents of modern chemotherapy may clear the blood-stream of infecting organisms, but, unless very active measures are taken by the prompt administration of plasma and other agents to correct the vicious circle of disturbed hæmodynamics, death may not even be delayed. In 1914 MacCallum emphasised the importance of peripheral vascular failure in diphtheria, but only recently has the value of blood-transfusion been recognised in malignant diphtheria (Pugh and Williams 1941). Plasma transfusions may come to occupy an important place in the therapy of many fulminant infections. Adrenal substitution therapy may be valuable, but it should be regarded as secondary, since if the condition has progressed to extensive destruction of the gland the ultimate outlook is very hopeless.

SUMMARY

Three cases of rapid death in children showing extensive bilateral hæmorrhage into their adrenals are described.

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It is suggested that the structural changes found in the body result from peripheral vascular failure and resemble those of surgical shock and that they should be regarded as a consequence of a bacterial toxæmia and not of adrenal damage.

In addition to chemotherapy treatment similar to that of post-traumatic shock should be given in fulminant bacterial infections.

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ESTIMATION OF "TRUE" ASCORBIC ACID IN URINE

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THE method of estimating ascorbic acid in the urine by titration with dichlorophenolindophenol (Harris and Ray 1935) has proved of great value in clinical investigation. The results obtained are accurate at high ascorbic acid levels; but the method suffers from the serious defect that urines contain a variable amount of sodium thiosulphate and possibly other substances which rapidly decolorise the indophenol dye. At normal and low ascorbic acid levels the results obtained are therefore unreliable. In view of this difficulty, a number of modifications of this method have been recommended.

Emmerie and van Eekelen (1934) remove the interfering substances by precipitation with mercuric acetate and subsequent treatment with hydrogen sulphide which they remove in turn by gassing with nitrogen. Meiklejohn and Stewart (1941) have worked out a method of estimation involving oxidation of the ascorbic acid by the ascorbic oxidase of cucumber. Other investigators have attempted to improve the specificity by using the photo-electric absorptiometer (Evelyn et al. 1938).

While several of these methods have given good results in the hands of competent research workers, doubts have been expressed as to whether the removal of interfering substances in the precipitation methods is really quantitative and whether the figures obtained can be relied on as representing the "true" ascorbic acid (Roe and Hall 1939). The specificity of the ascorbic oxidase methods has also been doubted (Neuweiler 1936). In any case these procedures are for the most part too complicated and time-consuming to be convenient for purposes of clinical investigation.

A simple and rapid lead-precipitation procedure for estimating ascorbic acid in urine is described here which gives figures agreeing closely with those obtained by the ascorbic oxidase method.

EXPERIMENTAL METHODS

Collection of urine.—Preliminary experiments confirmed that acetic acid, which is still used in many hospital laboratories, is much less effective than metaphosphoric acid for preventing the oxidation of ascorbic acid in urine (Bessey 1938). Urine containing 10% acetic acid lost as much as 10% of the ascorbic acid in an hour at laboratory temperature (fig. 1) while with 5% metaphosphoric acid the loss was only 1% in an hour. For most purposes 2–3 hour samples of fasting urine, or urine after an ascorbic acid-free breakfast, were collected by passing straight into bottles containing 10 g. metaphosphoric acid. The metaphosphoric acid was dissolved in a small volume of water before it was added to the collecting bottles. The samples were then diluted in measuring cylinders so that there were 200 ml. of solution for each hour during which urine was collected, and the estimation was done within an hour of collection.

Lead-precipitation procedure.—The urine (10 ml.) containing 5% metaphosphoric acid was put in a 15 ml. centrifuge tube and shaken vigorously after adding 1·5 ml. of lead acetate solution (25% $Pb(Ac)_2H_2O$). The precipitate separated rapidly on centrifuging: it could also be removed by filtration. The clear supernatant solution (1 ml.) was pipetted into a small conical vessel made by taking off the end of a conical centrifuge tube. The dye solution (50 mg. dichlorophenolindophenol in 100 ml. water) was added from a 2 ml. microburette while stirring with a glass rod, until a faint pink colour was obtained which persisted for 30 seconds. The pink colour was matched on a white background in a good light against a standard made by adding 0·02 ml. of the dye solution to 1 ml. 5% metaphosphoric acid: this amount was then subtracted from the burette reading obtained in the titration. The titration was repeated on further 1 ml. samples until concordant figures were obtained.

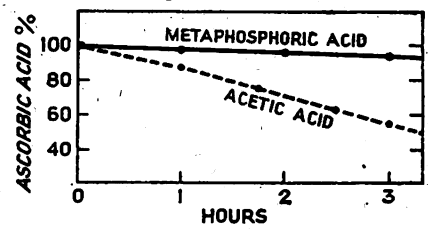

Fig. 1—Loss of ascorbic acid by oxidation in urine containing (a) 10% acetic acid and (b) 5% metaphosphoric acid, expressed as percentage of the amount originally present (3 mg./100 ml.). Laboratory temperature 22° C.

This method was preferred to the more usual procedure of adding the urine to the dye, since it avoided having present during the titration a large excess of dye, which might oxidise substances less rapidly oxidised than ascorbic acid. The dye solution was standardised by titration against a freshly made solution of ascorbic acid, acidified with metaphosphoric acid and brought to pH 3·5–4·5 before titration. The amount of lead acetate added was insufficient to precipitate all the metaphosphoric acid in the urine, but the thiosulphate was precipitated preferentially. The treatment with lead acetate had the further advantage of clearing the urine and removing some of the colouring matter so that the end-point of the titration was easier to determine. If interfering reducing substances other than thiosulphate are present in significant amounts they seem to be precipitated too or are removed by adsorption on the lead precipitate.

Recovery of ascorbic acid added to urine.—The lead precipitation method was tested by estimating the recovery of ascorbic acid that had been added to urine containing 5% metaphosphoric acid.

ASCORBIC ACID (mg./100 ml.)

Added	Estimated	Added	Estimated
5	5·0	5	5·0
10	9·5	10	9·5
25	24·0	15	14·0
55	56·0		

The figures gave no evidence of any loss of ascorbic acid through the lead precipitation and they agreed with the amounts added within the experimental error of 7%.

Tests with thiosulphate and other possible interfering substances.—Tests in which sodium thiosulphate was added to solutions of ascorbic acid showed that precipitation with lead acetate under the conditions described effected a quantitative removal of the thiosulphate. This is illustrated by the above experiments in which

Urine titrated directly	Urine after lead precipitation	Urine plus thiosulphate titrated directly	Urine plus thiosulphate after lead precipitation
0·64	0·58	1·55	0·59
0·89	0·59	1·60	0·58
1·13	0·70	1·54	0·69

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sodium thiosulphate was added to urine. The figures give ml. dye used per ml. acidified urine.

Of the other possible interfering substances that might be present in urine, glutathione, catechol, catechin and sodium thiocyanate at concentrations up to 10 mg./100 ml. did not reduce the dye fast enough to interfere with the titration. Quinol (10 mg./100 ml.) reduced the dye, but it was completely removed by precipitation with the lead acetate.

ASCORBIC OXIDASE METHOD

In order to check the accuracy of the ascorbic acid figures obtained by the lead precipitation method, the figures were compared with similar estimates of "true ascorbic acid" made by using an ascorbic oxidase method similar to that described by Meiklejohn and Stewart, (1941).

Procedure.—In the preliminary experiments a purified specimen of the cucumber oxidase was used; but this had no advantage over a simple cauliflower or broccoli infusion prepared by grinding a minced cauliflower with half the weight of water and an equal volume of sand and filtering the resulting pulp. This solution contained a very active oxidase and retained its activity for several days when kept in the ice-chest.

The urine containing 5% metaphosphoric acid was first titrated directly with the dye. A part of the urine (20 ml.) was then brought to pH 6·0 (indicator, bromcresol purple) by the careful addition, with vigorous stirring, of 30% sodium hydroxide, using a microburette. The oxidase solution (1 ml.) was added and oxygen from a cylinder was bubbled through. Portions (2 ml.) were withdrawn from time to time and titrated after adding 0·05 ml. glacial acetic acid. The titration figures could be plotted in the form of a curve (fig. 2) and samples were taken until the titration figures reached a constant value, generally after about 15 minutes. This constant value represented the thiosulphate or non-ascorbic acid reducing substances in the urine. The "true ascorbic acid" may be taken as the difference between the initial titration before adding the oxidase and the final

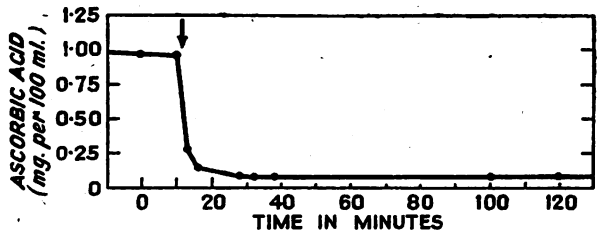

Fig. 2—Oxidation of ascorbic acid by the ascorbic oxidase of cauliflower. Enzyme added at time indicated by arrow. Temperature 20° C.

constant level (corrected for dilution with the NaOH and the oxidase solution). Control experiments showed that the final level was not due to the inactivation of the enzyme, since it was not affected by a further addition of fresh oxidase solution.

Figures for the ascorbic acid in a series of urines obtained (*a*) by simple titration (Harris and Ray 1935) and for "true ascorbic acid" obtained; (*b*) by the lead precipitation method; and (*c*) by the ascorbic oxidase method are compared in table I. The urines were obtained from normal subjects and neurological patients in whom there was no reason to suspect any urinary or dietary abnormality.

The urinary excretion covers a fairly normal range in the urines in the table, and it is evident that the figures for the total reducing substances represented as ascorbic acid by simple titration were often considerably higher than the "true ascorbic acid" figures: in one case the non-ascorbic acid reducing substance was as much as 50% of the "true ascorbic acid" figure. The figures for the "true ascorbic acid" obtained by the lead precipitation and by the ascorbic oxidase methods agreed very closely (statistical correlation coefficient 0·99); this was significant in view of the fact that these two methods depended on different principles—the lead-precipitation method on the removal of interfering substances, and the ascorbic oxidase method or the removal of ascorbic acid.

Effect of aspirin on ascorbic acid excretion.—Aspirin is commonly believed to increase the excretion of ascorbic acid, but we were unable to find any evidence as to whether the apparent increase is due to "true ascorbic acid" or due to other phenolic reducing substances in the urine. It is known that salicylates are partly excreted in the form of gentisic acid, which might be expected to reduce the indophenol dye (Knapp and Coburn 1942).

Estimations by the lead-precipitation method confirmed the rise in "true ascorbic acid" excretion in the second 2-hour period after taking gr. 20 of aspirin. In one experiment the rate of excretion rose from 32 mg. per day to 74 mg. per day and in another experiment from 22 mg. per day to 29 mg. per day.

ESTIMATION OF "TRUE ASCORBIC ACID" EXCRETION BY LEAD-PRECIPITATION AND ASCORBIC OXIDASE METHODS

A = Total reducing substance estimated as ascorbic acid by direct titration (mg./24 hr.)
B = "True ascorbic acid" by lead method (mg./24 hr.)
C = "True ascorbic acid" by oxidase method (mg./24 hr.)

Case	A	B	C	Case	A	B	C
1	9·1	7·7	7·8	10	10·7	8·9	8·2
2	8·9	5·7	6·2	11	7·1	6·7	6·7
3	10·8	7·8	7·7	12	10·8	8·5	8·2
4	14·6	12·6	12·4	13	45·4	33·4	32·1
5	14·4	13·4	12·9	14	47·6	41·4	41·4
6	8·8	7·3	6·8	15	41·7	33·4	33·4
7	18·3	16·7	17·0	16	34·1	31·0	31·0
8	15·1	13·4	13·4	17	19·2	15·2	15·2
9	13·9	10·1	10·9				

Experiments 1–12 were done on urines from neurological patients; experiments 13–17 were done on urines from normal subjects. The cucumber oxidase was used in experiments 13–16; in the other experiments the cauliflower oxidase was used. Statistical correlation coefficient between figures for "true ascorbic acid" by the lead-precipitation and ascorbic oxidase methods, 0·99.

DISCUSSION

The saturation test (Harris 1942) is better than an estimate of the resting level of ascorbic acid excretion for showing a dietary deficiency in ascorbic acid, but as the saturation test involves the accurate collection of urine and daily estimations for several days it is not always practicable. The resting level of ascorbic acid excretion gives an indication of the degree of saturation that can be of considerable value in clinical work. In many hospital laboratories it is the current practice to estimate the resting level of ascorbic acid excretion on a 24-hour specimen of urine that has been treated with hydrogen sulphide to reduce the oxidised ascorbic acid (Harrison 1939). Since the rate of ascorbic acid excretion on normal diets fluctuates relatively little during the 24 hours it is preferable to use an accurately collected 2–3 hour specimen of urine taken before breakfast or after a light ascorbic acid-free meal. If the specimen is collected in a vessel containing metaphosphoric (not acetic) acid and titrated within one hour there is no need to do the gassing with H_2S, and by using the lead precipitation method a much more reliable estimation can be made than by simple indophenol titration. Aspirin, or preparations containing it, can give rise to erroneous results.

SUMMARY

In urines containing a normal or low amount of ascorbic acid, titration with dichlorphenolindophenol does not give the true ascorbic acid content owing to the presence of sodium thiosulphate (which also reduces indophenol dye). In the method described here the thiosulphate is precipitated with lead acetate and removed before titration.

The figures obtained by this method agreed closely with figures for "true" ascorbic acid obtained by the use of the ascorbic oxidase.

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SOVIET MILITARY OPHTHALMOLOGY

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HEAD OF THE NOVOSIBIRSK EYE CLINIC

EVEN before the start of the second world war, Soviet ophthalmologists had devoted much study to the treatment of war injuries of the eye. It was clear to us that in modern warfare—in which hand-grenades, aerial bombs, mines, &c., which explode into a large number of small fragments, are used on a scale never reached before—the number of face wounds and in particular eye injuries would rise considerably. The eye injuries during the Franco-Prussian War of 1870 constituted only 0·86% of all injuries. During the various conflicts preceding the 1914–18 war, the percentage rose to 3·5–4. If we take into consideration the unprecedented magnitude of the conflict with Hitlerite Germany and the dangers to which this most precious organ of man is exposed, it becomes obvious that in all countries at war the question of treatment of eye injuries assumes a vital importance. Already before the war we had worked out a scheme for the proper handling of war wounds of the eye. Special attention had been devoted to the training of ophthalmologists in ocular traumatology, in the X-ray diagnosis of intra-ocular foreign bodies, in the extraction of magnetic splinters by means of the electromagnet, and in plastic operations in the region of the eye. The ophthalmic service was so organised as to ensure the earliest possible skilled attention to the wounded eye. The base hospitals were required to provide all necessary ophthalmic apparatus, in particular giant electromagnets.

Experience gained during the Civil War showed the advantages of organising base hospitals in such a way that the departments of ophthalmology, otolaryngology, and stomatology are grouped together, so that specialists in all the three branches could combine in treating wounds of the face in general. In modern warfare injuries are often multiple, and injuries to the eye, the nose and its accessory sinuses and to the mouth are often encountered in the same patient. The high efficiency of the ophthalmic service has assured the return of a high percentage of ocular casualties to the ranks of the Red Army and to the labour front. The practical experience and new information already gained under war conditions has made Soviet ophthalmologists better able to deal with such casualties.

PLASTIC OPERATIONS

Plastic surgery of the face in general, as an independent specialty, arose out of the experience of the first world war, pioneered by British and American surgeons—Davies, Gillies, Space, Shehan and others. Among Soviet surgeons V. P. Filatov originated a method of grafting a flap with a circular pedicle flap, which has been widely adopted in plastic surgery of the face. In the Novosibirsk Eye Clinic we have studied the problem of plastic operations in the region of the eye for over 15 years. We have designed a number of systematic operative procedures which combine simplicity of technique with excellence of results. They found wide application during the Civil War in the repair of lesions in the region of the eye. We were able to reconstruct entirely destroyed eyelids, conjunctival sacs, and large defects of tissue in the orbital region. The reconstruction of the conjunctival sac, if the smallest fraction of it remains, is generally done without grafting new tissue. We cut through the depth of the shrivelled and diminished conjunctival sac, separate the conjunctiva, stretch the divided sac by means of thick silk sutures and, at the moment of maximum stretch, insert a prothesis and tie the sutures over it. Experience has shown that while the wound surface thus formed at the bottom of the socket is kept on the stretch by the prothesis, it is eventually covered by the epithelium growing down from the edges of the wound and there is no subsequent shrinkage. This procedure has enabled many a patient to wear a glass eye without having to undergo a more complicated operation.

In many cases, after wounds in the neighbourhood of the orbital border—either above the eyebrow or at the side in the temporal region or below on the cheek—ugly contracted scars form, adhering to the bone. In such cases we have successfully applied a simple method; the contracted scar is partially separated and dissected out and the gap filled with a pedicled flap taken from the subcutaneous cellular tissue. These flaps, owing to the method of cutting, are easily grafted on to the denuded area, do not tend to shrink, and give an excellent cosmetic result. In cases of adhesions and defects of the mucous membrane of the lids and the eyeball, which are often observed after burns, we supply the missing mucous membrane by a procedure which we call the "transplantation flap method."

An incision in the skin close to the lid border is made. The incised skin is undermined on either side and pulled apart until a raw surface of the requisite size is obtained. Then small pieces taken from the superficial layer of the mucous membrane of the lip are planted on the raw surface—on the same principle as that of Davies, who grafts small pieces of skin. In this manner, when the transplant has taken, an area of lid skin with a mucosal surface is obtained which it is easy to transfer on a pedicle to the eyeball or the inside of the lid to cover the defect. As this procedure consists in first growing the necessary amount of mucous membrane and only then transferring it to the requisite spot, it is analogous to that of the gardener who first grows his seedlings and then transplants them; that is why we have called it the transplantation flap method.

For reconstructing eyelids I use a method worked out by my assistant Dr. I. N. Kurloff, which he terms "flap-pocket."

It consists in choosing healthy skin in the neighbourhood of the missing lid, making an incision and fashioning a pocket by undermining it; the inside of the pocket is then covered with mucous membrane taken from the lip; 7 to 8 days later, when the transplant has taken, a slice from the cartilage of one of the ears is obtained and intercalated between the skin and the mucous membrane; thus all three component parts of the lid—the skin, the mucous membrane and the cartilage—are ready. The last stage of the operation consists in transferring the ready-made lid to its final position on a pedicle.

It is general among plastic surgeons to assume that, as a rule, a plastic operation can only be performed when the scar has completed shrinking—i.e., a year or eighteen months after the injury was sustained. Such a lengthy period, in war-time, would practically exclude the possibility of the patient being able to return to the front. In consequence, this view has been very radically revised. Prof. V. P. Strakhov of Moscow applies plastic surgery soon after a war injury in this region, and we too have considerably curtailed the period of waiting. Experimental observations have shown that the reactions of the reticulo-endothelial elements of the eye, which play a leading part in inflammatory processes, subside as early as in 60 days after the injury. In consequence, in ophthalmic lesions, uncomplicated by serious fracture liable to cause suppuration in the bone, plastic operations may be performed 2–4 months after injury, and not a year, or a year and a half, as has been customary hitherto. This innovation has absolutely justified itself and enables us to speed up considerably the rehabilitation of such patients. In our aim to expedite the disappearance of unsightly scars, we resort not only to the usual methods of physiotherapy such as quartz-lamp, 'Sollux," and massage, but we have also made very extensive use of "paraffinotherapy." The latter helps considerably in mitigating pain in the scars and in lessening hyperæmia and the surrounding lymphatic and tissue swellings; it also softens and smoothes out the scars. In some cases paraffinotherapy enables one to dispense with operation altogether, in others it narrows the field of operative intervention considerably and shortens the period of waiting for the needed operation. Finally it is very useful post-operatively in speeding up healing and improving the results of the operation.

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The anæsthesia employed is either local or regional, by infiltration with solutions of 'Novocain' (procaine) and adrenaline of various strengths or general by the intravenous administration of 'Evipan Sodium.' The application of these methods solves entirely the difficult problem of suitable anæsthetics to be employed for plastic operations on the face, which take considerable time to perform and for which the usual facial mask is unsuitable. Narcosis by the nasal route, being technically very complicated and calling for a special anæsthetist to administer, is unpractical in war.

To deal with contracted scars adhering to the bone in the temporal region, where their excision threatens injury to the meninges, or in the nasal region, where excising and scar tissue might lead to the formation of a fistula or other complication, the following procedure has proved successful.

We do not excise the deep-lying parts of the scar; instead we cut all round it and separate it from adjoining tissues. In the depth of the scar which remains in position we remove only the epithelium and over this surface we perform the necessary grafting by any method which appears suitable, such as the above described pedicled-flap taken from the subcutaneous tissue. Experience has shown that such grafts take quite well and the results are entirely satisfactory.

IMPORTANCE OF THE CILIARY BODY

Wounds in the region of the ciliary body, especially when a foreign body is involved, are dangerous because they threaten the loss not only of the wounded eye but also of its uninjured fellow through sympathetic inflammation. The British surgeon Mackenzie had already a good grasp of this condition over 100 years ago. As the only hope of saving the good eye is usually the removal of the injured one, this operation is very widely performed in war-time. Still, in cases where the injured eye—as often happens—has retained a fair amount of vision, its removal is often opposed by the patient, and the surgeon is put in a very difficult position. Before the war the Central Ophthalmological Institute of Moscow and the Novosibirsk Eye Clinic had already collected data and experience in the treatment of industrial trauma, which showed that if the foreign body is removed from the ciliary body, smooth healing usually follows, and the eye can be saved without endangering the other eye. In the Novosibirsk Clinic we performed several excisions of the wounded ciliary body, which had prolapsed into the scleral rupture, and in one case (the first case of its kind ever to be reported) I removed a sarcoma of the ciliary body without any loss of sight of the eye; in all these cases healing was smooth and uneventful. The experience gained in these cases has stood us in good stead for the treatment of war injuries of the eye. In a series of cases we succeded in saving the injured eye by removing foreign bodies from the ciliary body in some (in one case a wooden splinter 6 mm. long), and by excising the prolapsed ciliary body; in some these measures were followed by closing the scleral and conjunctival wounds. We have thus laid the foundations of a new operative sphere in the eye—the surgery of the ciliary body—which is of great importance in war-time and enables us to save eyes where a short time ago it would have been considered impossible.

TRANSFUSION

Blood-transfusions are widely used by Soviet ophthalmologists for the treatment of eye wounds. First introduced in 1929 by Prof. V. N. Archangelsky in the Central Institute for the treatment of vitreous opacities, blood-transfusion has since been widely studied and applied in very diverse eye troubles and recorded especially in the writings of Prof. Archangelsky and his collaborators (Tashkent Eye Clinic). Among major war injuries, blood-transfusion has proved particularly useful for combating traumatic opacities of the vitreous, traumatic iridocyclitis, and in the treatment as well as prevention of the sympathetic inflammation of the sound eye. I can safely say that when treating a patient in the war zone, an injury to the ciliary body or even only a suspected injury is an absolute indication for the prophylactic transfusion of small quantities of blood, 150–200 c.cm. Lately, after many years' study of vitreous opacities and their pathogenesis, we have succeeded in proving that the absorption of vitreous opacities is beneficially influenced by the transfusion into the duodenum, by means of a duodenal probe, of 50–120 c.cm. of duodenal juice.

In severe and persistent vitreous opacities, when blood-transfusion alone does not produce the required effect, we shall have obtained excellent results by performing simultaneously blood-transfusions and paracentesis of the anterior chamber.

I would like to mention the valuable contribution made by Academician M. I. Auerbach to the study of blunt injuries, which form 20% of all war injuries of the eye. In his clinic excellent results have been obtained in the treatment of infected injuries of the anterior portion of the eye by the use of 'Albucid' (sulphacetamide), one of the sulphonamide group. A number of Auerbach's collaborators experimented with the use of vitamin K in plastic and other operations for war injuries. These experiments have shown the great value of this preparation in cases where hæmorrhage is likely, especially in patients with a lowered prothrombin content of the blood. The numerous contributions of Academician V. H. Filatov and his school on the grafting of the cornea have enabled Soviet ophthalmologists to combat corneal opacities arising after war injuries.

PLASTIC SPLINTS

T. J. B. A. MACGOWAN, CHM GLASG, F R C S
WING COMMANDER RAFVR; ASSISTANT SURGEON TO OUTPATIENTS AT GLASGOW ROYAL INFIRMARY

PLASTER-of-paris is now almost universally used in the treatment of fractures, particularly in ambulant cases. It is easily applied, adaptable to the limb and inherently rigid. One of its defects is its permeability, and, if full advantage is taken of its other properties, in ambulant cases it often loses its rigidity from the absorption of fluids. Many patients with fractures of the forearm and hand fail to carry out their specified daily tasks simply because the plaster cannot stand constant immersion in water; for example, the housewife in normal routine duties. Even lacquering with a cellulose dope will not help matters to any extent, and now that these dopes are not on sale even that procedure is impossible.

Several years ago this fault was brought home to me while treating a fishwife suffering from a fracture of the carpal scaphoid. After a day or two at her work, the plaster became so impregnated with fish oil and water that she became embarrassed by the smell and the attention of many cats in her vicinity. At that time 'Perspex' had just been introduced by the plastics industry, and samples were kindly supplied me by Imperial Chemical Industries for trial. This material, supplied in the form of sheets varying in thickness from $\frac{1}{16}$ in. upwards, seemed to hold the solution to the problem.

It is a transparent substance of the acrylic ester group of artificial resins, which can be softened by heat and moulded into a variety of shapes. This material, now supplied for the manufacture of dentures, I use in the sheet form which is the polymer derived from the original liquid monomer. In the future I suppose it will be possible to produce splints from the monomer painted on the limb and converted into the solid polymer in situ.

At first I found difficulty in working the sheet perspex into a splint which would maintain an accurate fit. The wrist is especially difficult to maintain firmly in a rigid container without pressure and friction areas developing, unless such a fit is obtained. The splint for a carpal scaphoid fracture is made as follows:—

Prepare a cast of the forearm and hand, exactly as in the first stages of the preparation of a celluloid splint. The difficulties of a single-piece splint are too great for rapid manufacture, but a two-piece splint, besides fixing the part equally well, is simpler to construct. Prepare two pieces of perspex sheet of the thinnest grade—one cut to the size of the dorsal and the other of the ventral side of the cast. Heat the sheet thoroughly and evenly, until it becomes rubbery, in a domestic oven, over a gas-ring, or by means of any source of heat which covers a large area of the perspex sheet. Apply to the model and bind in position, carefully moulding the material over all the prominent areas and into all depressions. An elastic bandage forms a useful binder, the moulding

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being completed with the hands in leather gloves. Boiling water has been recommended to plasticise the material, but good modelling is not always possible with this degree of heat. Remove the half-splint when cool, trim to a line (demarcating the ventral and dorsal areas) drawn on the plaster, and repeat this procedure for the other portion. Fit on the splint and make sure a good fit has been obtained—if, for instance, the ulnar styloid is pressed upon, a further local moulding can be made if the perspex is held over the flame of a spirit lamp or bunsen burner, softened and pressed with the fingers into a suitable shape. The two parts can be fixed with a special cement obtained from the manufacturers, but I have found the application of glacial acetic acid results in a rapid join rather like a weld; the acid dissolves the perspex and the two pieces become one on drying. I do not recommend applying the acid to the adjacent edges of the splint because of the danger of acid burns and the difficulty in removing the completed cast; instead a series of shaped perspex tabs are cemented over the junction of the two halves in several places. To remove the splint these tabs are then cut through with a small saw. The perspex can be cut with any saw, although a hacksaw is preferable. It can be filed to shape and if a high polish is desired any metal polish and a soft cloth soon brings the surface to the brilliance of glass. The date of application can be scratched on the splint in the usual way.

The advantages of this splint are: (i) perfect fit is ensured, no matter what occupation the patient is engaged in; (ii) the limb is visible throughout treatment; (iii) the splint is lighter than plaster and because of its transparency and waterproof quality always presents an attractive appearance; (iv) no special apparatus is needed for manufacture. The disadvantages are that: (i) the material is at present expensive; (ii) there is more work involved in the application of the splint than there is with plaster.

I wish to thank Imperial Chemical Industries for supplying samples for making both splints and retractors.

Reviews of Books

Pathology of Trauma

ALAN RICHARDS MORITZ, MD, professor of legal medicine, Harvard Medical School. (Kimpton. Pp. 386. 28*s*.)

Professor Moritz has written a book of such authority and distinction that it may be expected to win an international reputation. It is forensic companion in some senses to Behan's *Trauma in Relation to New Growths* but distinguished from it by its wider concept, its profuse original illustrations and the studied judgments which give it personality. References to modern literature are liberal and discriminating. Moritz confines himself strictly to the pathological anatomy of trauma, saying little of its clinical aspects and nothing of civil action or compensation. A section on the general principles of mechanical injury, including firearm wounds, is followed by an academical section on trauma and infection and a scholarly outline of the relation of trauma to new growths. Traumatic lesions of the various systems are then dealt with in seven sections, which are packed with sound references. The book is valuable for parallel reading and reference on questions of trauma, and there are no material omissions.

Synopsis of Pathology

W. A. D. ANDERSON, MD, assistant professor of pathology, St. Louis University; pathologist, St. Mary's Group of Hospitals. (Kimpton. Pp. 661. 30*s*.)

TEACHERS usually look askance at synopses, aids or other summaries of their own subject, yet Professor Anderson's is so excellent in its text and illustration that it has every right to a welcome. It is a dumpy octavo which fits comfortably in a jacket pocket and really does cover the whole of pathology in its 660 pages. The arrangement is the traditional one—the first third devoted to general pathology, the rest to special pathology—but it is modern in its details. Inflammation is considered in terms of leukotaxine and pH, there is an excellent account of virus diseases and, as is to be expected of an American book, more attention is given to mycotic infections than is usual in English books. In the sections on special pathology, disorders of the renal system follow the cardiovascular system and the account of renal disease is clear without over-simplification, though some might disagree with the order in the statement that "common causes of death in hypertension are renal failure (uræmia), congestive heart-failure, coronary occlusion and cerebral hæmorrhage." Dental pathology is given attention and indeed the whole section on the gastro-intestinal tract is excellent. Recent work on the Rh factor is described and its possible rôle in erythroblastosis fœtalis is discussed; there is an account of the crush syndrome and the more interesting tumours, though there is no mention of heparin or Wernicke's encephalopathy or the types of diphtheria bacilli. The two most striking merits of the book are the illustrations and the references. The photographs and photomicrographs are of a high standard and well chosen, but many of the colour plates are out of register.

The author's basic approach on the whole tends to emphasise the anatomical changes found at operation or autopsy rather than the functional disorder that is associated with morphological changes; this faulty orientation is difficult to avoid in a short book so full of good information, and a reading of Lichtwitz's *Functional Pathology* would give the student the necessary corrective. The book will serve students as a reference work and will be useful for the diagnostic pathologist as a complementary work to Stitt's *Practical Bacteriology*.

Year Book of General Surgery 1942

Editor: EVARTS A. GRAHAM, MD, professor of surgery, Washington University, St. Louis. (Year Book Publishers; Lewis. Pp. 848. 19*s*.)

MORE than ever during war-time is this book welcome. In its 850 pages no important contribution to general surgery seems to have been omitted. However embracing a surgeon's knowledge of current literature may be he should have this book; at least it will recall to his memory writings of the past year which he may have forgotten, and it is useful to have papers on one subject collected together for comparison.

Front Line Treatment of Wounds

The Medical Officer to Midlothian Battalion Home Guard. (Livingstone. Pp. 31. 4*d*.)

THIS résumé of the bare essentials of first-aid in the field has been designed for the rank and file of the Home Guard rather than for stretcher-bearers. "You and Your Comrades" is the alternative title. Both the matter and the presentation are on the whole sound; though in mentioning crepitus (p. 14) it seems a serious omission to leave out reference to the danger of "testing for" crepitus. Here and there words are used which may be unfamiliar to the average Home Guard, but the book can be safely recommended as a useful little guide.

Ophthalmic Prescribers Codex

FRANCIS E. PRESTON, DOMS. (Lewis. Pp. 176. 10*s*. 6*d*.)

THIS novel little book is divided into three parts, one devoted to ophthalmic formulæ, another brief one to treatment, and the third to miscellaneous information. The list of formulæ is comprehensive, and makes the volume a useful practical guide to ophthalmic prescribing. Dosage is in apothecary and metric measures. It is doubtful, however, whether any useful purpose is served by abridging treatment to the extent attempted by the author. Wounds of the cornea cannot be described in three lines, and there are so many slips that if this section is included in the next edition it will need drastic revision. The last chapter contains a lot of useful information on anæsthetics, miotics and mydriatics. It should be noted however that cocaine exerts no appreciable paralysing effect on accommodation. No attempt is made to differentiate between the mydriatics and cycloplegics, and both cocaine and adrenaline are omitted. But it was resourceful to suggest that the patient with retinitis pigmentosa "should live in a country where there is much sunshine so that his working day is not curtailed."

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THE LANCET

LONDON: SATURDAY, JUNE 26, 1943

SEAMAN'S ABLE BODY

THE long and arduous campaign for a healthy Merchant Navy has followed the pattern familiar on land, with its battle of environment, battle of personal hygiene, and battle of medical services. The battle of environment, starting at the turn of the century, was fought out before the Parliamentary Public Health Committee, at the congresses of the Royal Sanitary Institute, in the press and elsewhere, by Collingridge, Herbert Williams, Dearden, Home, Howard Jones, MacMaster, Charles White and Greenwood Wilson (with his plea for slum-clearance at sea), to name but a few. It culminated in 1937 when the Association of Port Health Authorities saw its main recommendations, repeatedly pressed home by deputations to Government departments, adopted in the Board of Trade *Instructions to Surveyors* on the construction of living quarters for masters and crews in new merchant ships. The principal improvements were in ventilation and lighting, and in the provision of central heating, drying-rooms, heated wash-places, separate messrooms, oilskin lockers, individual metal wardrobes and food lockers, and proper water-closets. In the battle of personal hygiene ways had to be found to persuade the seafarer, lifted at last from his "extreeme misery" dating from Hakluyt's time, to make the best use of his improved living accommodation—to attack the "evil habit which has associated bad living with the courage always needed at sea," and the coal-in-the-bath mentality. In 1939 the work of a joint committee set up by the Shipping Federation, the National Union of Seamen and the Officers' Societies resulted in the National Maritime Board Agreement, which where faithfully applied has maintained cleanliness and a measure of comfort in life at sea, though the war has naturally interfered with its complete operation. Its effect has been increasingly supplemented by local port welfare committees working under the Seamen's Welfare Board set up in 1940 by the Minister of Labour. This board seeks to provide the seaman in port with baths and cleansing-stations, hostels, facilities for recreation and education, and convalescent or rest homes like those provided for Civil Defence workers. The Ministries of Health, Labour and War Transport are represented on a joint advisory committee which is considering recommendations of the port medical officers on improved dietaries with better arrangements for storing, cooking and serving food, pre-employment preventive vaccination and inoculation, the engagement of sick-bay stewards not only for first-aid but also to educate the seafarer about health and particularly venereal diseases, tuberculosis and anti-mosquito precautions, and an improved system of medical examination.

The third battle, of medical services, now begins to take shape. On paper the EMS scheme brought free hospital treatment for the Merchant Navy, and a general practitioner service is now available for them at all ports, but it seems clear that the seaman still does not get anything like the health, welfare, hospital and medical services available for the Armed Forces whether in peace or war; and there is still no central coördinating authority. Lately a memorandum drawn up by Sir ALEXANDER MACGREGOR, after patient investigations in the Port of Glasgow, moved the Glasgow Corporation to urge that any Government scheme for a postwar medical service should include special provision for the health and welfare of merchant seamen at the ports. This memorandum, which gained the unanimous support of the Association of Port Health Authorities at its meeting on May 6, would provide material for the consideration of a Royal Commission on service in the mercantile marine, such as Lord MARCHWOOD proposed two years ago. Much depends on whether we regard the Merchant Navy as a service, like the Royal Navy, or as an industry, but in either case it has a strong claim to a unified health and medical service of its own. Changes in existing legislation would certainly be required, and the setting up of a Royal Commission would perhaps be the simplest way of reconciling the various Government departments and organisations interested.

Let us however not forget that informal action taken with goodwill now would bring much of Macgregor's integrating machinery into being, without waiting for changes in the law. He suggests first the establishment of "a central representative committee in touch with Government departments which possess health functions in respect of seamen afloat and ashore, and with local committees at the major ports." The joint advisory committee already in being has no local committees at the ports, and may not be sufficiently representative of seamen's interests. Macgregor's second recommendation is that at the ports the port health committee and the health committee of the local authority should together provide a medical and hospital service for seamen in addition to their statutory port duties. Much of this could be attained by informal arrangement between local authorities and regional hospital organisations under the EMS scheme. Progress has been rapid where the health committee is also the port health committee, and where there is good liaison between the local authority and the regional hospital officer. Macgregor's third point is a plea for close understanding between the health and welfare services at the ports. There are ports where such an understanding seems to arise naturally, as at Cardiff under Dr. GREENWOOD WILSON'S inspiration. Here the corporation, at the request of the port welfare committee, has lately completed a scheme, difficult to carry through in war-time, providing baths for seamen in the docks area, adding on their own initiative a medical cleansing section for cases of scabies and the like. The scope of the local committee as Macgregor sees it would cover medical attendance for seamen on ships or in hostels at the ports, now undertaken by medical men appointed by the Shipping Federation, or by the shipowner or ship agent, the provision of suitable outdoor clinics of a parent hospital capable of supplying the main forms of treatment, including specialist treatment, aftercare and rehabilitation. All except two of these treatment facilities are already provided through institutions like the "Dreadnought" at Greenwich and the Royal Hamadryad Hospital at Cardiff. At other ports the next best thing is achieved smoothly by arrangement

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with local voluntary and municipal hospitals, through the EMS and otherwise. The two exceptions are aftercare and rehabilitation, and there the seaman is no worse off than other workers. Macgregor's local committee would also be responsible for bathing arrangements and "such other matters, medical and sanitary as might be appropriate"; these should include an adequate ambulance service, now badly needed. He would have every ship's officer, as part of his training, taught something of first-aid, the hygiene of ships, and the treatment of venereal disease; in the larger ships they could be assisted in the application of that knowledge by sick-bay stewards who had had more intensive and practical training in the same subjects.

There seems little doubt as to the feasibility of this scheme. We are already muddling through with a patchwork organisation which at some ports works well enough to give almost all that Sir ALEXANDER MACGREGOR wants. It is the old story of the voluntary improvement in factory hygiene before Parliament intervened to make it compulsory everywhere. What is needed is a rationalisation of the patchwork organisation so that it works equally well all the time at all ports in peace or war, and a closer linkage, including joint arrangements for rest, convalescence, aftercare and rehabilitation, with the welfare machinery already set up. It is for the Government to decide on the best ways of achieving these aims on a national basis.

ENDS AND MEANS

THOSE who believe, as we do, that a comprehensive medical service should be established must be willing eventually to declare the terms on which they would take part in it. This is where the difficulty begins—especially for those practitioners who have hitherto enjoyed complete independence. The negatives are at present clearer than the positives. Doctors as a whole will not accept direct employment either by the state or by the local authorities, and can give good reason why they should not. But if competitive private practice is to give place to a free medical service for all, the doctor must be employed and paid by somebody. To most members of the profession who have considered the problem it has seemed that the least objectionable employer would be the profession itself; and many, like Dr. RAYMOND GREENE in our last issue, would vote for a service run by a National Medical Corporation entirely in the hands of doctors. They forget that the public, who are to pay something near £200 million a year for the service, will insist on a share in its management; and the idea of control by a central corporation, even if it represented all interests fairly, is disliked both by local authorities and by voluntary hospitals, which also have a tradition of autonomy. Since laymen can fairly demand a large share in the administration of a comprehensive medical service, we do not see how the profession could manage its own affairs entirely unless the appointment and payment of medical personnel were separated from the rest of the service and entrusted to a Medical Guild of the kind we suggested a fortnight ago. Such a plan, however, will hardly commend itself to administrators intent on simplification, and will not be realised unless the profession insists.

The number of possible solutions to this problem is not unlimited. If we exclude, for one reason or another, a Government medical service, a municipal medical service, a central corporation run by the public, and a central corporation run by the profession, the next possibility seems to be decentralised control by regional councils representing all the interested parties; and we therefore ask our readers to give careful thought to the scheme for Provincial Health Councils outlined on p. 813. Could this type of organisation be made acceptable to doctors? Could it provide the essentials of professional freedom which we all demand in the ultimate interest of the public? Obviously any scheme which abolishes the greater part of private practice is going to mean big alterations in professional life; but who wills an end must will some means or other. To find means acceptable to all parties is not easy; and when Dr. GREENE accuses us of standing first on one leg and then on the other we can only reply that this is one of the recognised methods of progression.

PLASTICS IN SURGERY

PLASTICS are so called because, usually by the application of heat, they can readily be made plastic, and moulded to a desired shape which they will retain when the plasticising agent is withdrawn.[1] They are mostly organic substances of high molecular weight synthesised from coal, petroleum or cellulose. An early example, invented in Birmingham in 1865, is celluloid, made from nitrocellulose and camphor, but in the last few years we have come to know many others—cellulose acetate, the resins synthesised from phenol or urea and formaldehyde, the solid polymers made by uniting the smaller molecules of liquids or even gases; more familiar as Cellophane, Bakelite, Nylon and so on. In a note on the annual meeting of the British Plastics Federation,[2] Mr. V. E. YARSLEY, FIC, tells us of some things to come in the surgical line. He foresees an extension of the collodion idea, so that the surgeon about to operate will dip his hands in a solution which, as the volatile solvent evaporates, leaves a flexible and waterproof sterile glove, easily peeled off later. The same solution can be sprayed on to form a protective covering for skin wounds and burns. From solid plastic materials can be made hands and fingers, noses and ears much as a denture is made, and plastic obturators can replace bony losses in skull or face. Plastic bone-plates are said not to interfere with callus formation, and nylon sutures have proved harmless to tissues. Obvious applications of these materials are in anatomical and other demonstration models, drainage-tubes and the like, but YARSLEY suggests more enterprising uses in the construction of flexible tendons, and of artificial joints in rheumatoid arthritis.

Thirty years ago GAUVAIN[3] was making celluloid splints for cases of spinal caries, applying a vest followed by layers of muslin, all impregnated with collodion, to a cast of the trunk, and he advocated a similar technique for most conditions requiring splintage. The objection of inflammability had been overcome, but the splint could not often be made direct on the patient because during the long period while each layer was drying the evaporating solvent

1. See Appleton, E. *Endeavour*, 1942, 1, 110.
2. *Times Trade Supplement*, April, 1943.
3. Gauvain, H. J. *Lancet*, 1913, i, 826.

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overcooled the limb, besides permeating the atmosphere. On another page MACGOWAN describes the modern version of that technique. He uses a transparent synthetic resin, supplied in sheets. This is softened by heat and while still hot is firmly moulded to a cast of the affected part. The splint is made in two halves, which are held together by plastic strips cemented on with acetic acid. The casting of a preliminary model is time-consuming, but a plastic is soon to be introduced which can be painted direct on the limb as a liquid and there solidified. Shortly before the war a bandage incorporating a plastic was reaching us from America. The story goes that a young champion swimmer sustained a Colles fracture before an important gala; it was feared that a plaster would be too heavy for swimming, and in any case would become soaked and soon break. His father, a boot-manufacturer, hit on the idea of combining a bandage with a plastic material used for patent leather toe-caps. This was applied to the boy's forearm, and we like to think he won his race. But the plastic bandage is too stiff to fit easily round, say, the wrist, and tends to form wrinkles.

Any plastic material that is going to compete successfully with plaster-of-paris must be soft and supple, and preferably be fluid when applied. Those connected with plastics are confident that such a material has now been found. Plastic splints have the great advantage of being permeable to X rays, so that a fracture can be watched radiologically during repair, whereas a plaster must be removed to decide on X-ray union. The plastic splint can also be transparent, and a wound can be watched through one in a way impossible with plaster. Plastics will be particularly useful for the fractured scaphoid, for both FURLONG and BUXTON have pointed out to the British Orthopædic Association that in the Army the fractured scaphoid often needs a change of plaster every fortnight for months, because it inevitably gets soaked and sodden. There is also an opening for plastic protective dressings for the minor injury in industry. The dressing on a small cut gets wet and dirty at work and may form a pathway for serious infection. The plastic dressings lately introduced are not flexible enough, especially over the fingers. Plastics should provide the light splint that will allow the workman with a fracture to be rehabilitated at his work—the ideal place for rehabilitation. Incidentally, we are warned by the trade that plastics are not going to be cheap.

Mr. Walter Elliot's committee, set up "to consider the scope and method of employment of mobile VADs by, and their relationship to, the Services," issued their report (Cmd. 6448, 4*d*.) on June 8, and it has been accepted by the War Office and by the British Red Cross and the Order of St. John. The committee believe that the objections (see "Under which Flag?" *Lancet*, 1942, i, 778) to the assimilation of the VADs into the ATS outweigh the advantages. They recommend that the VADs retain their distinctive uniform (avoiding articles identified with particular ranks in the nursing profession or involving excessive labour or expense to maintain) and that their status and range of duties be the same as those of an ATS nursing orderly. The committee further suggest that VADs, like the ATS, be subject to military law and be enrolled into the women's forces, that where members are serving with the Army the VAD office of commandant be abolished and the welfare and technical supervision of members be taken over by officers commanding units and QAIMNS officers respectively. Military service as a VAD would count as service in the ranks and selected members would be eligible for direct commissions in the ATS.

Annotations

SAFETY WITH RAYS

IN a foreword to the 6th revised report of the British X-ray and Radium Protection Committee the Minister of Health reminds us that the rapid extension of irradiation methods into industrial practice ought to carry with it full appreciation of the risks. Only in the fullness of years do these occupational risks reveal themselves, but in no single case has a risk come to light against which proper precautions have not been found, so that although there must always be risks in radiological work it is only right to say that a vigilant watch is maintained on them by a committee which has performed this work since 1921.

In detecting toxic effects from irradiation the committee says that the changes in the counts are often more important than the absolute numbers of red and white cells. "It is the special merit of systematic blood-counts that these changes may be detected in the early stages of X-ray or radium action." Of safeguards in giving treatment, the report recommends accurate calibration of the radiation sources, and that the radiation output should be checked periodically and also whenever any part of the apparatus is altered or replaced. Radium manipulations involve risks; a new consideration is the radioactive atmosphere in which those engaged in such work have to live. Radon is a most potent gas physically and the recommendations here have evidently been founded on the results of experimental inquiry; they are: "The escape of radon should be very carefully guarded against; the room in which it is prepared should be provided with an exhaust fan, the control switch for which should be outside the room. The radon of the air in laboratory, factory, workshop or other working quarters should not exceed a concentration of 10^{-10} curie per litre." One curie occupies a volume of about 0·5 c.mm. at NTP, so this safety concentration amounts to about 1 in 10^{-16}, or one molecule of radon in ten thousand million million of air. This chemically inert gas is vastly more dangerous than the most poisonous gases known to chemists, for these are all practically innocuous at a dilution of one in a million.

CARDIOVASCULAR CLUES THAT COUNT

IN no branch of medicine is it more important and more often difficult to make a definite diagnosis than in diseases of the heart. Many patients are worried that their heart is at fault, and unless they are convincingly reassured are apt to leave the consulting-room dissatisfied and start on a round of medical visits that ends in the establishment of a chronic cardiac neurosis. Yet the early signs and symptoms of cardiac disease may be so elusive that it is only the experienced clinician who is prepared to dogmatise. White,[1] one of the most experienced of American cardiologists, suggests several useful points. The pain of angina pectoris is often mild for a considerable period, but its relationship to exertion and tendency to be more easily evoked after breakfast than later in the day are useful clues in confirming the diagnosis. It is not a throbbing, sharp or stabbing pain, nor is it described as a prolonged ache; it is a continuous pain which becomes more severe as the exertion is increased. An important feature is that it is not made worse by deep breathing; a precordial pain which is exacerbated by deep breathing is due to pleuropericarditis and not to coronary disease. The sex-incidence of angina pectoris is significant. If a woman is under 50, pain in the chest is probably not evidence of heart disease, unless hypertension or diabetes mellitus are also present or unless the patient has a particularly bad family history of heart disease, such as angina pectoris, coronary thrombosis or hypertension. The pain felt under the left breast seldom gives rise to any difficulty in diagnosis;

1. White, P. D. *New. Engl. J. med.* 1943, **227**, 980.

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its persistent lack of relationship to exercise, the presence of local tenderness, and the flippant manner in which the patient refers to it, all hallmark it as a neurosis. Substernal pain coming on at rest is most likely gastric in origin, provided an acute coronary thrombosis can be excluded. In the more obscure cases of gastric origin the possibility of a hiatus hernia should be borne in mind. Excruciating pain of sudden onset which radiates down the back in a middle-aged or elderly hypertensive subject should suggest a dissecting aneurysm of the aorta. Another cardiac pain to which White again draws attention is that in the right hypochondrium brought on by exercise and relieved by rest. This he attributes to acute engorgement of the liver and claims to be one of the earliest symptoms of failure of the right ventricle, and therefore of considerable importance in patients with mitral stenosis.[2] A fact often overlooked is that when the heart is of normal size dyspnœa is not due to heart disease. Periodic dyspnœa with tachycardia, collapse and fever, especially in a cardiac patient with congestive failure, suggests a pulmonary embolism. White believes that many such attacks are never adequately diagnosed and that in many cases the embolus comes from the lower limbs and not the heart. Conversely, in all cases of pulmonary embolism the lower limbs should be carefully examined for thrombophlebitis, or what White prefers to call "phlebothrombosis." He believes that in many of these cases ligation of the veins is more efficacious than anticoagulants, such as heparin. Two other points stressed by White are worthy of note. Tachycardia which is difficult to control by digitalis and rest, particularly in auricular fibrillation, is suggestive of thyrotoxicosis, or infection or infarction of the lungs, and perhaps the former is the important cause. When hydrothorax is predominantly left-sided it is due to some condition other than heart-failure, unless the right pleural cavity is obliterated. The likeliest causes for a left-sided hydrothorax are pleurisy, pulmonary infarction, malignant disease and polyserositis.

LANATA AND PURPUREA

Withering little realised, when he introduced the foxglove to the profession in 1785, what a teazer he was giving the pharmacologists; 150 years later no-one can say definitely what are the active principles of digitalis, and how they affect the heart. Fortunately practice has outrun theory, and the clinician who sticks to his pet pharmacopœial preparation can be sure that the patient will receive the expected benefit. The search for the active principle received a fillip in 1930 when Sydney Smith isolated from the leaves of *Digitalis lanata* a new glycoside, digoxin, which is not present in either the leaves or root of *Digitalis purpurea*. The BP and USP preparations of digitalis are all obtained from purpurea. According to various workers, of whom Stoll[3] may be taken as fairly representative, lanata is preferable to purpurea, as it has been possible to isolate, in the form of the mixed isomorphous digilanids A, B and C, a preparation of the glycosides which accounts for the greater part of the total activity of the drug itself. The experimental evidence, however, is equivocal, as is shown once again in a paper from South America,[4] and even where it is convincing the analogy with the effect of the same preparation on the diseased heart in man is seldom complete. Some day we shall undoubtedly be presented with a purified digitalis preparation, capable of synthesis in the laboratory and with all the merits of the old galenical preparations, but that day is not yet. As Freedberg and Blumgart[5] bring out in their survey, the most that is usually claimed for a "new" digitalis preparation is that it is as effective as, and no more toxic than, pharmacopœial preparations, and the final criterion must always be the clinical effect of the drug. Of the well-proved preparations, digitalis pulverata BP is undoubtedly the best. The tincture, like all tinctures, should be superseded whenever possible by a non-alcoholic preparation under war conditions, and the infusion is seldom used in this country, though as Burn[6] points out "some physicians like to give it because it was in this form that the drug was originally given by Withering." Digoxin is an efficient and active preparation but has no proved advantage over the powdered leaf except that it can be given intravenously, an advantage which can also be claimed for K-strophanthin. For some reason K-strophanthin has never achieved in Britain the popularity it enjoys on the continent. If standardised according to the BP 1932 its potency seldom varies, and many cardiologists find it invaluable in those comparatively few cases where the degree of congestive heart-failure demands immediate treatment. The present position has been thus summarised in America.[7] "The general practitioner will do well for the present to select his therapeutic agents from USP preparations, and to leave the final evaluation of purified glycosides to the experimental investigator. Both he and his patients stand to gain thereby." For USP read BP, and the advice is equally sound here.

SULPHONAMIDES AND NICOTINIC ACID

THE antagonism between sulphonamides and *p*-aminobenzoic acid is now well known; *p*-aminobenzoic acid is essential during the growth of many bacteria, and sulphonamides interfere with its proper utilisation by virtue of their similarity in chemical structure. Evidence is now accumulating that there is the same sort of antagonism between certain sulphonamides which contain the pyridine ring, especially sulphapyridine, and nicotinic acid and other substances which also contain that group. Presumably this is another example of the condition, postulated by Fildes, of two substances with like chemical configuration competing for the same enzyme mechanism. Some years ago, nicotinic acid and its amide were identified as being important constituents of the vitamin-B complex, being especially associated with the prevention of pellagra. Biochemical analysis has shown that as part of the complex compound, triphosphopyridine nucleotide, nicotinamide plays an important part as a coenzyme for basic oxidations in the metabolism of cells. Thus the new association between sulphonamides and vitamins opens up many possibilities. The evidence for this association has come from a variety of sources. West,[8] showed that sulphapyridine inhibits the usual curative effect of nicotinic acid on dogs fed a deficient diet so as to produce "black-tongue" (equivalent to pellagra), and this has been confirmed. Nicotinic acid is a growth-promoting substance for *Staphylococcus aureus*, and sulphapyridine inhibits this promotion of growth.[9] Nicotinamide stimulates the respiration of dysentery bacilli[10]; this stimulation is prevented by sulphapyridine and by sulphathiazole but not by sulphanilamide; the effect of sulphapyridine and sulphathiazole can be reversed by an excess of nicotinamide but not by *p*-aminobenzoic acid. Recently Teply, Axelrod and Elvehjem[11] have studied the same phenomenon as shown in vitro by *Lactobacillus arabinosus*, an organism which requires nicotinic acid for its growth. They find that bacterial growth can be prevented by sulphapyridine, but that

2. *Ibid*, 1942, **226**, 217; *Lancet*, 1942, **i**, 623.
3. Stoll, A. The Cardiac Glycosides, London, 1937.
4. Ciera, R. P. *Arch. lat.-amer. Cardiol. Hematol.* 1942, **12**, 171.
5. Freedberg, A. S. and Blumgart, H. L. *New. Engl. J. Med.* 1942, **227**, 874.
6. Whitla's Pharmacy, Materia Medica and Therapeutics, London, 1943.
7. Goodman, L. S. *Bull. N.Y. Acad. Med.* 1942, **18**, 112.
8. West, R. *Proc. Soc. exp. Biol. N.Y.* 1942, **46**, 679.
9. West, R. and Coburn, A. F. *J. exp. Med.* 1940, **72**, 91.
10. Dorfman, A., Rice, L., Koser, S. A. and Saunders, F. *Proc. Soc. exp. Biol. N.Y.* 1940, **45**, 750.
11. Teply, L. J., Axelrod, A. E. and Elvehjem, C. A. *J. Pharmacol.* 1943, **77**, 207.

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this action of sulphapyridine can be inhibited by low concentrations of *p*-aminobenzoic acid or by larger amounts of nicotinic acid and its derivatives, or by an unknown substance in liver extracts. It is not yet clear which stage in the utilisation of nicotinamide is upset by sulphapyridine, but Teply and his colleagues consider that sulphapyridine does not act by preventing the synthesis of nicotinamide into its more complex derivatives, the coenzymes. The interference with *p*-aminobenzoic acid accounts for a large part of the therapeutic effect of sulphonamides, but it is not the whole story.

LEAD ABSORPTION AND LEAD POISONING

BEFORE the war there were more than 1500 workers in the lead industries of this country, and 150,000 painters. Today there are probably many more, and it is important that they should be safeguarded against poisoning. Absorption and poisoning are not synonymous, for many workers absorb a considerable amount of lead without developing symptoms. In the early stages the commonest symptoms are weakness, loss of weight, constipation and colic, and the most useful sign is the contrast between apparent muscular development and actual physical power. In the absence of later signs such as wrist drop, blue line on the gums and stippling of the red cells, the diagnosis of poisoning is a matter of clinical judgment not subject to proof.

Buxell [1] states that the threshold limit for long exposure to lead and its compounds in the air is 1·5 mg. of lead per 10 cubic metres of air; and work by Dreesen [2] in 13 storage-battery plants east of the Mississippi River confirms this. He showed that among 776 workmen albuminuria and symptoms of early plumbism were most common in those exposed to the highest atmospheric lead concentration. Generally speaking, the urinary and blood lead estimations, reticulocyte, stipple-cell and polychromatophilia values also varied with the atmospheric lead concentrations. Employees who had an average lead exposure of more than 3 mg. per 10 cm. were smelters, pasters, oxide mixers, group assemblers, plate driers, finishers, and repairers. The prevalence of arterial hypertension among these employees was not significantly different from that observed in other industrial workers.

Cholak and Bambach [3] found that in 1052 normal persons with no occupational lead hazard the mean lead concentrations were 0·030 mg. per 100 g. of blood, 0·027 mg. per litre of urine and 0·28 mg. per 24 hours' sample of fæces. Exposure to lead in industry raises these values, and the corresponding figures for 86 men engaged in making white lead were 0·086, 0·241 and 3·76. Data from representative groups of workmen may therefore be used to find out the character of exposure in a plant, to measure the uniformity and efficacy of the means employed to control the exposure and to establish whether it is uniform in severity; and this exposure may be correlated with the atmospheric lead concentration. Working with Kehoe and others, the same observers [4] have shown that excretion is much slower than accumulation, and that risk of poisoning can be reduced by alternating a period of exposure with a longer period of non-exposure. More absorbed lead is excreted in the urine than in the fæces, and since adequate urinary excretion depends on adequate intake of fluid, a supply of palatable water is important in an industrial plant. Constipation, since it is said to increase the absorption of lead from the gut, should also be avoided.

Between 1900 and 1933 the mortality-rate from lead poisoning in the United States fell from 3·1 per million to 0·7, thanks mainly to improved methods of control and good personal hygiene. The estimations, now suggested, used in conjunction with stipple-cell counts, mark another advance in the control of this hazard; and there is good reason to hope that the condition will soon be obsolete and curative treatment no longer necessary. Hunter and Aub [5] showed that repeated injections of parathyroid extract in 6 patients with chronic lead poisoning rapidly and effectively mobilised some of the stored lead from the bones, and they confirmed a striking parallelism between the storage and excretion of lead and calcium. Kehoe and his colleagues,[4] judging from one case examined over short periods, doubt whether elimination of lead from the body can be much accelerated by artificial means; but this opinion is not acceptable without much more evidence.

RENAL FUNCTION AFTER CRUSHING INJURY

IN Britain at present opportunities for clinical investigation of crush syndrome are fortunately rare, but experimental work may shed some light on the mechanism of the renal injury or perhaps suggest methods of investigating such cases in man. In an ingenious series of experiments,[6] a group of workers at University College have analysed in detail the depression of renal function they were able to produce in the anæsthetised animal by crushing and hammering the tightly bound limb and then keeping it bloodless for 5 hours. Their main criterion was creatinine clearance, which was found to fall considerably within a few minutes of release of the compressing tubing. This fall was followed by a period of anuria and low blood-pressure; if urinary flow was then stimulated and blood-pressure raised by intravenous fluids of various kinds, the creatinine clearance rose, but only to half normal. At the same time the urine became acid and contained pigment and casts. The mechanism of this damage was investigated by partial obstruction of the ureter on one side. This procedure, by cutting down urine flow, might be expected to concentrate any filtered toxin in the tubules; but in four experiments there was no significantly increased damage. In the fifth experiment the measure even seemed to protect the kidney, for the creatinine clearance was higher after the obstruction was removed than on the control side. The damage was not due to anuria since it was still produced when diuretics maintained a flow throughout: it was not due to low arterial tension, since after histamine injection (with resultant hypotension and anuria), there was no such damage. The kidneys showed no structural lesion in any way comparable to the changes in man; even the mitochondria were intact except in one animal which developed irreversible anuria. In particular, there was no histological evidence for blockage; nor were the kidneys tense as they should have been if either blockage or poisoning of tubular epithelium alone had been responsible.

It would be interesting to know if the hammering, either alone or combined with ischæmia for one hour only, would produce this picture. Bywaters and Popjak [7] have recently shown that ischæmia of rabbit limbs due to tight binding if maintained for one hour produces only slight changes. If it is maintained for three hours or more, irreversible muscle necrosis leads to limb swelling and hæmoconcentration, but to no permanent renal damage, judged by urea and creatinine output or by histological criteria. A rise in blood-urea was obtained, due largely it was thought to increased katabolism, since the urea output was greater than in the control period.

It is hard to compare these two sets of results, since in the rabbit experiments the criteria were rather more gross—more "clinical"—than in the dog experiments. The dogs were killed without recovery from anæsthesia;

1. Buxell, J. *J. industr. Hyg.* 1943, **25**, 35.
2. Dreesen, W. C. *Ibid*, p. 60.
3. Cholak, J. and Bambach, K. *Ibid*, p. 47.
4. Kehoe, R. A. *Ibid*; Cholak, J., Hubbard, D. M., Bambach, K. and McNary, R. R. *Ibid*, p. 71.
5. Hunter, D. and Aub, J. C. *Quart. J. Med.* 1926, **20**, 123.
6. Eggleton, M. G., Richardson, K. C., Schild, H. O. and Winton, F. R. *Quart. J. exp. Physiol.* 1943, **32**, 89.
7. Bywaters, E. G. L. and Popjak, G. *Surg. Gynec. Obstet.* 1942, **75**, 612.

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so it is not known what the later course would have been.[1] A further difference is that rabbit muscle, unlike that in man and the dog, contains no myohæmoglobin, and hence no pigment was excreted. If it is difficult to relate findings after controlled damage in different animal species, it is doubly difficult to relate them to the findings in man, where damage is often highly complex. Winton and his colleagues suspend judgment, and are content to point out that the "main features of the failure in renal function are clearly the same immediately after injury in acute experiments on dogs and as soon as they have been observed in man." To that extent their observations "support the recommendation that diuretics should be given freely." In the animal experiments diuretics did not protect the kidneys, but they might prolong life in man by increasing excretion until the kidneys recover spontaneously.

TONSILLECTOMY ON THE GRAND SCALE

IN 1928 Paton noted that 43% of the girls at a large boarding-school had had their tonsils removed,[1] and their subsequent health records were no better than those of the girls left in possession of their tonsils. The operation confers much benefit in carefully selected cases but there seemed to be an unnecessary attack on the innocent. This conclusion has found considerable support, and Paton has himself added to the evidence in a paper[2] dealing with the records of 909 girls admitted to the same boarding-school between 1930 and 1939. In these years the incidence of operation was even higher than previously, 48% having had their tonsils and adenoids removed, 6% tonsils only and 3% adenoids only, a total of more than half the population. Again there is no evidence of an adequate return for this mass attack. During the follow-up period the number of admissions to the sick house were 3·7 per girl for the operation group and 3·3 for those not operated on. The former lost 20·1 days per girl from illness and the latter 18·5. Division by causes of sickness reveals no material difference between the two groups in the incidence of pharyngitis, acute adenitis, ear-ache and otorrhœa, influenza, the common cold (slightly higher in the operation group) and the infectious diseases of childhood. Tonsillitis was less frequent in the tonsillectomised but bronchitis more frequent. In terms of days lost they suffered rather more than the non-operated from respiratory complaints.

It may be argued, as was pointed out in the Medical Research Council report on epidemics in schools,[3] that if the tonsillectomised had not undergone the operation their sickness-rates would have been higher and that the operation had made them as resistant as the normal child. There is no way of disproving that argument—except by deliberate experiment—but as Paton remarks it is difficult to believe that subnormal health needing correction in this way is a feature of over half the child population. He is inclined to think that the operation group in his study was, in fact, less healthy after operation than the control group as judged by number of school days lost and that removal of the tonsils had increased susceptibility to respiratory infections and of adenoids to acute otorrhœa. These deductions are partly based on very small numbers, and it is certainly difficult here to distinguish cause and effect. Frequent respiratory infections are often an incentive to tonsillectomy; a higher incidence of these complaints in the operated than in the non-operated may therefore be due not to the operation per se but to the failure of the operation to achieve its aim. Nevertheless, these figures give further support to the conclusion reached in the MRC report, that though few would cast doubt on the real value of the operation in properly selected cases there is a tendency for it to be performed in a routine prophylactic ritual for no particular reason, and with no particular result.

1. Paton, J. H. P. *Quart. J. Med.* 1928–29, **22**, 107.
2. *Ibid*, 1943, **12**, 119.
3. *Spec. Rep. Ser. med. Res. Counc., Lond.* 1938, No. 227, p. 124.

CITRIC ACID IN METABOLISM

MANY capable physicians' knowledge about citric acid begins and ends with pot. cit. gr. 30, though some of the more nutritionally minded might talk about the citrus fruits, and clever pathologists might say quite a lot about citrated blood. Yet in the last 15 years citric acid has emerged as a substance of biological importance. The seeds of certain plants, notably cucumbers, contain an enzyme which will oxidise citric acid with the corresponding reduction of methylene-blue, and this discovery gave a fillip to our knowledge about citric acid, just as the discovery of urease led to a great advance in our knowledge about urea metabolism. Chemical methods followed,[1] and citric acid is now known to be a normal constituent of tissues and urine, and to be excreted in larger amounts during periods of alkalosis but in smaller amounts when the pH of the body falls.[2] Hence it seems to play some small part in regulating the acid-base balance of the body. It has been suspected for some years that citric acid might be formed as a step in the degradation of pyruvic acid, that all-important intermediary in carbohydrate and amino-acid metabolism.[3] This view has been criticised, but so many chemical names are now being bandied about by both sides that it has become a little difficult for the onlooker to follow the battle. Some clear evidence that citric acid is a real stage in carbohydrate metabolism has recently been produced.[4] The administration of glucose had been shown to lead to an increase of pyruvic acid in the blood-stream (and in this connexion it will be recalled that pyruvic acid accumulates in the blood in vitamin B_1 deficiency). It has now been shown that the administration of pyruvic acid to normal dogs increases the amount of citrate in the circulating plasma. We shall await with interest the extension of this work to man, and information about the place of citric acid in all his metabolic disorders which are known to involve carbohydrate metabolism.

1. Pucher, G. W., Sherman, C. C. and Vickery, H. B. *J. biol. Chem.* 1936, **113**, 235.
2. Sherman, C. C., Mendel, L. B. and Smith, A. H. *Ibid*, p. 247.
3. Krebs, H. A. *Biochem. J.* 1940, **34**, 775.
4. Grande Covian F. and de Oya, J. C. *Rev. clin. Esp.* 1943, **8**, 309.

Sir WILLIAM GOSCHEN was a son of the first Viscount Goschen and had the family talent for finance. His career was in banking and insurance, but he gave much of his time and thought to charitable undertakings, and especially to the London Hospital, with which he was associated for nearly forty years. In 1931 he succeeded the late Lord Knutsford as chairman of the hospital, and if he had less skill than "the Prince of Beggars" in attracting donations, he performed an equal service by his management of the available resources. Almost daily he was at "the London," and he paid weekly visits to the wards and departments. He died there on June 16.

Surgeon Rear-Admiral Sir ARTHUR BANKART, KCVO, who died at his home in Devon last Saturday, was an Edinburgh graduate. He was surgeon in the royal yachts *Osborne* and *Victoria and Albert* from 1899 to 1914, and after distinguished service in the last war he resumed this appointment, retiring in 1924.

In celebration of the centenary of the fellowship the president and council of the Royal College of Surgeons of England will hold a reception at 8 PM on July 21 in the Great Hall of Lincoln's Inn, when some of the newly elected honorary fellows will be admitted. Owing to paper restrictions invitations will not be issued to fellows but those desiring to attend should apply for tickets to the secretary. At 3 PM on July 21 there will be a general meeting of fellows when various important questions will be under discussion.

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Special Articles

FUTURE OF MEDICAL SERVICES

HEALTH PROVINCES

BRITISH medicine is technically excellent, but the British public does not always get the best medical care possible with the available technical knowledge and skill. The public knows this, and its conviction has been heightened by what Sir William Beveridge has told it, by the reports issued by the medical profession itself, and by the proposals of the Labour and Liberal parties. The Government has been convinced and has promised that the necessary action shall be taken. In particular, it has given certain specific pledges to Parliament:—

1. There is to be a comprehensive health service.

2. In return for a single insurance payment, everyone—whether worker, dependant, or retired person—is to have the right to full medical care, at home, at the doctor's consulting-room, and in hospital, without further payment.

How is the Service to be run?

Many doctors have been driven to the belief that the best means of providing a comprehensive service would be a National Health Corporation, working on a regional basis. They fear that direct ministerial rule would make for bureaucracy, inefficiency, and an administrative hierarchy which would deprive the doctor of responsibility for his patients. They fear that direct local-authority rule would be open to the same objections, with the added dangers of parochialism and the intrusion of local politics into medicine. In answer to the objection that a statutory health corporation would be undemocratic, the supporters of this proposal maintain that the BBC shows greater sensitiveness to public opinion than do Government departments or local authorities. They add that its ultimate responsibility to Parliament, while free from day-to-day inquisitions, represents a model of how democratic machinery can be made to work.

However much the Government may agree with these propositions, it has to face the fact that there are two powerful and worthy groups of bodies opposed to control of health services by a central corporation. The voluntary hospitals have the country in their debt; they ascribe their virtues, perhaps rightly, to their independence. The municipal authorities already own and run more than half the country's hospital services, and are doing the job with increasing efficiency, though some of them still have a long way to go. They will not willingly surrender the service of which they are proud.

We have to ask ourselves whether there is a way which would combine the legitimate demands of all three parties.

Thinking on a functional basis, it is clear that the ideal unit of health administration is much larger than a county borough or even a county, but smaller than the civil defence regions as we know them. Penzance cannot have its major key hospital at Bristol, any more than Prestatyn can be served by Cardiff. The ideal area is one large enough to support a 98% complete medical service, with an adequate specialist staff employed whole-time on their specialties, yet compact enough to have easy lines of communication from the periphery to the centre, both for patients and relatives coming in, and for peripatetic consultants going out. Such an area might vary in size from one and a half to three counties. England and Wales would naturally divide itself into some thirty such sub-regions. If London is excluded, each would have a population of between ¾ and 2 millions. The reason why the medical service of such a sub-region would not be quite complete is that certain important but limited specialties, such as cerebral surgery and the domiciliary treatment of post-encephalitics, are best concentrated in one or two national centres.

These functional health areas are unlikely to coincide with the best areas for other services—for example, electrical supply, water supply, and drainage. To clarify the issue, the new areas might be termed Health Provinces; similarly other functional areas would be Electricity Provinces, Water Provinces and so on. Each of these functional provinces would require an ad-hoc authority to administer it.

What then might be the composition of a Provincial Health Council? Such a council would be called upon to make three groups of people—the local authorities, the voluntary hospitals, and the doctors and other health officers—work together harmoniously. In this task it would be handling large sums of public money. The handling of public money is often regarded as necessitating direct electoral accountability; but Treasury grants to the Universities, licence monies to the BBC, and subsidies in war and peace to many industrial concerns provide precedents for more remote control. A health council must represent all interests and force them to coöperate. On such a body, therefore, no interest, except ultimately the public interest, should be in a position to override the others. In so far as the council's doings need supervision, then the grant-giving Ministry of Health, or a National Health Council, could provide it.

With these thoughts in mind the composition of the council becomes clearer. First, the public must be represented, either by direct election, or perhaps preferably by Crown nominees; there is little enough interest in the election of local authorities, and if local elections are multiplied, this interest may well vanish. Next the hospital-owning authorities must be represented—the local authorities and the voluntary hospitals. Then, it would be a great advantage to have university representation, particularly if the university concerned has a medical school. Finally the health workers—doctors, nurses, technicians, and even the most humble grades—must have their representatives. Here we may hope for direct election by postal ballot, rather than union representation. Obviously, union candidates will get strong backing, but direct union nominees are likely to be resented by non-union members.

So heterogeneous a council would only work efficiently if backed by a strong—and that means highly paid—administrative staff to present plans and to guide its deliberations. To avoid the danger of over-centralisation and office-thought, each council should have its field service of investigators or inspectors, and a public relations department. The field service would be responsible both for assessing public need and also for ascertaining how far that need was being met. The inspectorate might report on the efficiency of the service offered by grant-aided institutions—though not on the efficiency of personnel. The public relations department would be responsible for investigating and straightening out complaints by members of the public, as well as the necessary publicity work.

Doctors might perhaps accept such Provincial Health Councils without too many qualms. They would bear no relation to the familiar borough or rural district councils. They would preserve democratic control, and their coverage would be large enough to permit proper planning, yet small enough to preserve individuality and avoid the dangers of a remote bureaucracy. A further safeguard might be provided by setting up medical and other advisory committees, with power to investigate and to publish reports.

The authority of Provincial Health Councils would have to be statutory. They could be financed by direct Treasury grant, according solely to the actual needs of the health province. From this block grant, payments would be made both to voluntary and municipal hospitals, again on a basis of need, assessed by the technical officers of the council and debated no doubt by the council in full

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session. Since the council would be the health planning authority, it is essential that it should not be by-passed. Both municipal and voluntary hospitals must look to it and not any central body for their grants. Otherwise it would not be possible, for example, for the council to close down redundant or inefficient hospitals, by the simple expedient of stopping their grants.

It seems reasonable that the council should set up, own, and operate the local health centres. There is much to be said, also, for it being empowered to set up, own, and operate such new hospitals as may be needed. New fever hospitals will certainly have to serve areas far wider than those at present covered by most local authorities, and it is seldom satisfactory to have hospitals under one authority serving the needs of perhaps twenty others.

Position of the Doctor

The Government has promised universality of health benefits, obtainable from a single insurance payment. Health reformers demand provincial planning of hospital services. Doctors demand a high degree of professional autonomy. Provincial Health Councils would provide part of the answer, but the position of the doctor in the scheme has yet to be considered.

GENERAL PRACTICE

It is almost universally agreed that urban general practice can most efficiently be carried out from health centres, where eight or ten doctors work together. In such centres doctors have a chance to develop and pool special skills. By the employment of an appropriate staff they can be relieved of much form-filling and clerical work. They can have the benefit of a common clinical laboratory and theatre for minor surgery. They can arrange off-duty times, holidays, and study-leave. They can avoid the burden of the surgery in the home. It is obviously to the doctor's advantage if the health centre is owned and maintained by some benign statutory body. He can then concentrate on his job, without worrying about the thousand and one minor problems of supply, cleaning, and so on. But he must be assured that he can still call his soul his own. His professional work must not be subject to supervision. For his patients' sake, he must be his own master. This would have to be made absolutely clear in his contract with the health council. For administrative purposes, the doctors of the centre would constitute its committee. They should elect a chairman, who would deal with the day-to-day administrative problems. But each doctor should have direct access to the central staff of the health council without local intermediaries.

There remain the vexed questions of remuneration and appointments. All doctors at present in practice, including those temporarily in the Services, would be offered entry to the national health service, and must receive compensation for capital and goodwill. Some might wish to remain outside, relying on such private patients as preferred not to claim their benefits; but the chances outside might well be small. The GP in the Service would be bound to give up private practice of the fee-charging kind: for permission to receive private fees would give rise to the belief that money can buy preferential treatment. The alternative systems of payment, therefore, are a basic salary plus a capitation fee, or an all-in salary, in either case combined with a pension.

It is an open secret that the Government has provisionally proposed an all-in salary, starting, after three years' assistantship, at £650 and rising by £30 a year to £1200 as a basic rate, with higher posts available to the general practitioner at £1400 and £1600 a year. (We trust this does not imply some kind of hierarchy in general practice.) In favour of the all-in salary proposal is the fact that it would end competition for patients, and would free doctors from the fear of loss of capitation fees as a result of refusing certificates. The Beveridge proposals, when realised, will place a greater strain on the certifying capacities of doctors, and the honesty of patients. And competition inside a health centre might lead to individual rivalry and disunity which would be far more damaging than when doctors work apart. An all-in salary is no more incompatible with free choice of doctor than are the capitation payments of NHI. Another argument in favour of the all-in salary proposal is that many practices are too large for efficient work, and a reduction in size would be easier if not complicated by the question of capitation fees. Against the all-in salary proposal, it is urged that piece-work makes for good work, that doctors are human, and that by and large, under the capitation system, the good and bad men get their deserts.

The task of the profession is to prevent the degeneration of the art of medicine into an industry or trade. We may feel that the art is most likely to flourish when not too closely linked with financial considerations. But we would add that freedom from financial anxiety is equally important and the salary rates must ensure such freedom. No-one can foresee postwar salary values, but a starting salary of £850, a rate of increase of £50 a year, and a basic ceiling of £1400, with no expenses, should provide a basis for discussion. There should be additions for higher qualifications and special skills. Salaries must, of course, be fixed nationally and not locally.

Appointments must obviously be publicly advertised. Assistantships for a year or so, at £500 a year, in health centres should be regarded as a pre-requisite for the general practitioners. The final selection board should include the practitioners of the centre, and representatives of the Provincial Health Council, with one or more outside medical assessors.

HOSPITAL AND SPECIALIST PRACTICE

The Government's plan for a comprehensive service is to cover both domiciliary and hospital specialist treatment. Inevitably, then, most specialists would devote most of their time to treating the national insurance patient. There might remain some living room for the private consultant, but it is likely to get smaller rather than bigger.

We would expect, therefore, a majority of whole-time salaried specialists, with a decreasing minority of part-time ones. The starting salary might well be the same as in general practice—£850—though in view of the specialist's additional skill the ceiling should go up to £2000. Part-time rates should be proportionately lower, to compensate for the higher outside earnings.

A condition on which doctors will do well to insist is that the municipal hospitals should adopt the principles of professional autonomy as in voluntary hospitals. The firm or unit must replace the hierarchy, and the medical committee must take over many of the higher functions of the medical superintendent.

Clearly, if specialism is to be fairly rewarded, the public must be protected from the pseudo-specialist. A national roll of specialists must be compiled, based on both experience and qualifications. This roll might be compiled by committees of the Royal Colleges in consultation with each other, possibly with subcommittees in each health province.

THE MEDICAL OFFICER OF HEALTH

It may well be asked whether the MOH should retain his position as the servant of the smaller local authority, if a large new health authority is to be superimposed on the existing structure. That local specialists in social medicine, intimately concerned with environmental health, health statistics, and health planning will be needed, may be taken for granted. But if friction is to be avoided, it would be best for the general practitioner and the social doctor to come under one administrative umbrella. He could still act as health adviser to the

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local council. But since he would be organising the prophylactic health services—child welfare and school medicine, ante- and post-natal services, industrial health, and diphtheria immunisation—through the health centre, it would be best for his administrative loyalties to be the same as those of his clinical colleagues.

National Organisation

Two parallel national organisations appear to be needed. First, the Ministry of Health could perform most of its present health functions, and be responsible for allocating block grants to the Provincial Health Councils.

Secondly, a supra-provincial council, representing all health interests, should be responsible for running any services that must be organised on a national scale. Among other tasks this National Health Council might foster initiative and experiment in medical teaching and give grants to medical schools. It would also allocate grants to the national specialist hospitals, essential for highly specialised treatment, advanced teaching, and research, and might set up such new national specialist hospitals as were needed. It might finance the Medical Research Council. And it might decide on national rates of pay for members of the medical profession.

FAMILY PLANNING CLINICS

A CONFERENCE of branches of the Family Planning Association was held in London on June 19 with the Lady Denman in the chair. The inauguration of clinics for the treatment and investigation of involuntary sterility, to be held on the premises of the present contraception clinics, was considered, and medical officers from many clinics throughout the country thought the project a good one. The association hopes to establish a London centre at which pathological investigations and research on seminology could be undertaken; many of the medical officers present undertook to attend a week-end instructional school on modern methods of investigating sterility.

Mr. CEDRIC LANE-ROBERTS pointed out that most sterile matings are due to some degree of subfertility in both partners. Study of such cases has become so complicated that many practitioners will probably be glad to send patients to "motherhood clinics"; the centre doctor must of course keep in touch with the patient's general practitioner. He had seen such work carried out at the Exeter clinic, where it has been shown that, in spite of inadequate quarters and staff, it is possible to achieve the highest standard of efficiency in advanced techniques. This centre is also doing valuable research. He considered that a central bureau was needed in London, where team work could be undertaken and from which research findings could be published.

Dr. MARGARET HADLEY JACKSON (Exeter) described the running of a "motherhood clinic" in the premises of the contraception clinic. She had had full coöperation from the radiologist and gynæcological surgeons of the area, as well as the help of the expert pathologists of Exeter, who were undertaking studies in seminology. On very simple premises it had already been possible to carry out insufflations, and many salpingogram examinations, endometrial biopsies and Hühner's post-coital tests. She emphasised that careful tabulation of data is an essential part of the clinic duties; and pointed out that though some clinics might not be able to undertake such exhaustive examinations this was not important since many have the necessary facilities available at neighbouring hospitals.

Mr. ALECK BOURNE reminded the association of the enormous field for research which their clinical material presented. There is reason, he said, to believe that there is some real biological cause for the falling birth-rate, expressed in the increasing subfertility of male and female individuals. The steady fall of birth-rate in such countries as the Balkans (where contraception is negligible) supports this view. Though there are great difficulties in establishing clinics for the treatment of sterility, he believes that in doing so the association will be tackling one of its main objectives.

In England Now

A Running Commentary by Peripatetic Correspondents

THEY were talking in the night-nurses' room over a pot of tea. "He got a telegram this morning to say his wife had had a girl," said Smith, "and all yesterday evening he was sitting on the edge of his bed doubled up and groaning with pain. He said he could feel his back opening and closing. He was certainly feeling something. He was as pale as a sheet and the sweat was standing out on his forehead and on his lip." "That's what they call couvade," said Jones. "South American Indians or something do it. The man goes to bed and has the witch doctor and all his friends round him and gets the pains, while the woman works in the fields and quietly has the baby under the hedge. A man in my village did it. He was real bad, and his wife never had any pain at all." "Well, this lad in A 23 was groaning all night," said Smith, "and he was fast asleep—no mistake. He was rolling around in the bed half doubled up and groaning and fast asleep. He woke some of the other patients with the noise he was making, but he never woke. When I came on yesterday he told me he was getting the pains every half-hour, and then later it was every quarter of an hour. He thinks very highly of me. I told him he would have a girl. It's only an old wives' tale, you know—when the man has the pains, the baby is a girl. But sure enough, when the telegram came it was a girl." "Do you think he was really in pain," I asked. "Or was he only feeling something he thought was a pain?" That stopped them.

* * *

If medical planners want to know what practice will be like under the control of a lay committee of a local authority or group of authorities they need only ask their colleagues whose life has been tied up with aldermen and councillors—the medical officers in the public health services. A sorry tale would be the outcome; not so much from juniors and assistants who to their elected bosses are less than the dust beneath thy chariot wheel as from chiefs and deputies who have to deal with their lay masters in conference and committee. There are, of course, chairmen who, being experts in their own private affairs, appreciate that their medical officer can also be a man of integrity of soul with a desire to do his best. Such a chairman is heaven-sent sunshine to the official, who can then get on with his job, feeling that in questions of policy and finance he has the backing of real power and democracy—the good of the neighbour. But there is the other type, armed with brief authority but nevertheless a potent nuisance. In him is concentrated the power-urge; he is chairman; his chief official is a debased salary-slave to be ordered about; and only a doctor at that. Between these extremes there are all the intermediate types; and the same can be said of the aldermen and councillors who go to form the rank and file of the ruling committee. As individuals they are mostly decent men and women, eager to learn, fair in their dealings, passionate in their desire to help society; but in the concourse of a committee-room decisions are often taken hastily in the babble of cross-talk and party strife. Sober balanced argument, as one would have in a well-conducted debating society, with subsequent voting after reasoned deliberation, is absent. Fortunately, larger issues may be left to the chairman and medical officer of health, or to a small subcommittee where more time can be given to them, and where a carefully worded report has a chance of winning the day. But art and not science is the basis of success; and art without science will not make for good doctoring. Utopia for medicine will need a new type of layman in the council chambers of democracy if laymen are to have the final say in the destiny of our profession.

* * *

The Government has got the wrong idea about us girls and our legs. There are two kinds of stockings in this vale of tears, named, in the haberdasher's jargon, "unfashioned" and "fully fashioned." Unfashioned are made like a tube; fully fashioned have curves to match nature, woven into the material. Owing to the peculiar contours of the human leg, unfashioned stockings are so much salvage in a couple of days—well, say three. They begin by being too tight in the calves and above

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the knee, and too slack at the heel and ankle. The result is not merely an æsthetic fiasco (which hardly matters just now) but a total loss. The tops of these unrealistic garments (planned presumably to cherish the leg of a dining-table) tear under the suspender, the back seams go into a row of little peep-holes down the calf, and the heels wear blisters in the owner and holes in themselves in one diabolic combined offensive. No woman who wants to save time, money or material flings her substance away on such trash. She buys a fully-fashioned stocking and goes on wearing it, often for months before the first darn (with a well-organised system of reliefs, of course). It marks one of the first hitches in the utility campaign that the women of England are spending hours of their brief leisure trudging from shop to shop on the trail of the fully-fashioned breed. There are stockings, millions of stockings, all unfashioned and relatively useless; a fraction of the number of fully-fashioned would keep the bright and beautiful English girl skipping round the lathes for months to come without a darned thing on her mind—or on her feet either. As it is she is a crippled miserable hag who spends every Sunday with the darning needle. Let us have a decent lisle fully-fashioned stocking, deserving the honest name of utility, and which of us will hesitate to shake a pretty leg in the country's business?

* * *

Someone has no doubt remarked that our common language is one of the great obstacles to Anglo-American understanding. Postwar coöperation is going to be difficult unless we appreciate that we are different nations, with different standards and different outlooks, but if we do realise our differences we shall be able to make full use of the vast amount we have in common. Who but an American would end a letter "with Best Wishes for the Empire"? Even the bluest of die-hard tories would hesitate to use such a phrase. Or take the reaction to the declaration of war in the States. Within a few weeks of the entry of America into the war I received a letter from the editor of an American journal informing me, with regret, that it had been decided to suspend publication for the duration of the war. And now I have received the following from another American medical journal: "Because censorship laws during war-time require so much detail, it is practically impossible for our journal to comply with them. Therefore, we hope you will understand the removal of your name from our mailing list for the duration of the war." What are these censorship laws that are so troublesome that journals find it easier to avoid them than try to comply with them? We have a strict enough censorship in this country, but there is little difficulty in complying with it. But that the American censorship is complicated is confirmed by the emasculated condition of certain American journals when they arrive over here—with pages torn out and the title of the missing article heavily blacked out in the index. Our librarian sublimates his wrath at this interference with efficient cataloguing by spending long hours trying to decipher the blacked-out title. A little cold water works wonders.

I only pray that our differences will never disappear. Hollywood, jazz, and American slang may be strange to our eyes and ears, but Americanisms are only unpleasant when perpetrated by Englishmen. Let us keep our national characteristics, including our languages, and all will be well.

* * *

Came the time at last when your correspondent was told that he was fit to be peripatetic and that a journey was really necessary. With his overworked WVS wife he made for the house of kind friends in his native land. Departure from London was a novelty—one of the new double-decker sleepers, comfortable and matey. The ticket examiner said I must pay the full fare, but the car-conductor aided my convalescence by contradicting and stating that a refund would be made on request. The journey on the main line was pleasant and uneventful. Table at breakfast was shared with a HLI major and lady who made an ineffective effort to have the war-time sausage classified as not a meat course. She was firmly informed that she might have sausage *or* bacon, but not sausage *and* bacon.

We saw our main-line train steam out punctually. News of our connecting train before we started on a branch-line of the old Highland Railway was suspiciously vague. The air was keen, and consideration for hyperchlorhydria brushed aside patriotic feeling so that we crossed the road for a second breakfast. It was an hour and a half before at last we left, but comfort was afforded by the news that the new train went straight through to our journey's end. A travelling ticket collector, an unexpected phenomenon, dispelled that delusion. We must change at X and again at Y. "Would we catch the connexion at X?" "Aye, if she's still there." After a pleasant and leisurely progress through fine scenery with a noteworthy absence of snow we arrived at X to find that "she" wasn't there. Another wait ensued, and we were thankful for that second breakfast. Prospects of catching the connexion at Y seemed dim, but it was some relief to hear that there was a good bus service and that the buses started from just outside the railway station. After three-quarters of an hour's delay we were off again and shortly heard "All change here" at the county town, our penultimate stage. Yes, there was a train on (4½ hours later)—"Five o'clock if ye care tae wait." We didna, but with hand-luggage (all we had) blithely passed the barrier to the bus outside. No such luck; again we had been misinformed, for all buses started nearly a mile away in the High Street. Thither we went, uphill all the way, to find the next bus was due in an hour's time. My wife knew from previous visits a good restaurant to which she guided me, but the door was shut and a notice up "Closed for the dinner-hour." Were we in Caledonia or Hibernia? But that lost journey was not after all in vain—the sight of a garage opposite brought fresh hope to two tired travellers. Certainly we could hire a car, said the proprietor as he called a driver. The driver was not so sure, "Should we no' ask the polis' furrst?" These scruples were quickly overcome, all was well and our friends received us with Hielan' hospitality.

So was completed a journey of 660 miles. Once off the main-line adherence to time-table was not too strict and trains naturally were not many, but everybody was helpful and cheerful, eager to answer the most stupid passenger's questions. What mattered it, then, if the information given, sometimes spontaneously, was not invariably accurate? Greased line, a small Green-Highlander and a 9-lb. salmon ended off a pleasant night and day.

* * *

When one sees a cadaver lying on the post-mortem slab—gaunt, thin, uncovered—one is apt to reflect on the stark unloveliness of the dead human. Compared with a deceased mouse or bird, their natural colours still splendid in the quiet dignity of death, there is something uncanny in the ashy pallor of man. So also in life we are at a disadvantage when undraped and in our birthday suits; all of us reduced to a least common denominator. Even a pair of bathing drawers or a bath robe makes a difference, and a man can look the world in the face as an athlete or a philosopher. He is childish indeed who talks of the tyranny of clothes. Let him look at himself in his mirror and observe the scraggy legs and pendant abdomen of middle age, the comical baldness of head and the less required hirsuties of other parts, and ask himself if he is the god-like fellow his patients think he is. Does he imagine he would get that consultant's fee if trousers, waistcoat and jacket did not cover his nudity? Does he reflect what a sorry picture he would be with nothing but his binaural stethoscope dangling from his neck in sartorial impudence? Even a utility suit, however sadly we deplore the absent turn-up, is better than that.

* * *

I had paid a visit to the blacksmith's wife and stepped into the forge to have a word about her with maister. He had just lifted a white-hot shoe out of the fire and was hammering it on the anvil as though his life depended on it. Sparks and chunks of glowing metal flew in all directions, many alighting on my coat. I can take a hint as well as most, and, feeling de trop and a little hurt, backed out of the door and into my car. Apologetic and sweating, the smith came running after me. "Zorry, doctor," he said, "I zeed you come een but I couddn stop. You got to strike while the iron's 'ot." Of course you have. When confronted with the literal interpretation of a proverb one ought to recognise it.

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Letters to the Editor

THE TUBERCULOSIS SCHEME

SIR,—Memo 266/T of the Ministry of Health tells us that the primary object of the special measures of assistance it offers is "to secure diagnosis and treatment at the earliest possible stage." But the beds just aren't there (look at the waiting-list in your Parliamentary column last week) and what, I ask, will be the effect on a patient of "encouraging" and "persuading" him to "undergo treatment as soon as the disease has been ascertained" if there is no sanatorium bed for him to go to.

The urgent need then is for strict and intelligent economy in the use of the sanatorium beds at our disposal, and for this purpose I suggest the following grouping of cases as they present themselves at the dispensary:

Group 1: Definite cases of early TB which may probably do well under favourable home conditions. (Domiciliary treatment.)

Group 2: Suspicious cases which need careful observation to establish a definite diagnosis.

Group 3: Established cases which require institutional treatment.

(1) The lack of sanatorium beds may turn out to be an actual advantage for benign cases which may eventually recover under adequate rest and conservative treatment at home, without the hazards of collapse therapy.

(2) Definite diagnosis is essential for the proper operation of the new scheme. TB or not TB, that is the question. Valuable sanatorium beds are occupied by observation cases which turn out to be non-TB. Could not beds be allotted in local or regional general hospitals for these important and clinically interesting cases, to be dealt with by the hospital staff in consultation with the tuberculosis officer.

(3) The remaining cases which for one reason or another require institutional treatment (sanatorium or special hospital) can be subdivided into:

Subgroup A.: Priority cases of early localised pulmonary TB which would benefit most from sanatorium treatment, with or without collapse therapy. Included are all those whose chance of cure would be spoiled by delay.

Subgroup B: Slowly progressive (and not too far advanced) cases which would benefit from sanatorium plus collapse treatment but not take any great harm from a little delay.

Subgroup C: Advanced and chronic cases unlikely to benefit from sanatorium treatment but needing symptomatic treatment and proper nursing. Cases which have to be isolated for the protection of their relatives, especially children. These should never occupy sanatorium beds; what they need is hospital accommodation of a simpler kind.

Some classification of this kind is essential if the generous scheme of mass radiography and payment of allowances is not to become discredited in public opinion.

Doncaster. E. G. W. HOFFSTAEDT.

TRAINED NUTRITIONISTS

SIR,—Professor Mottram says (*Lancet*, April 10) the British Dietetic Association has so far "done nothing to standardise requirements" for training of hospital dietitians. Whereas, since its foundation in 1936, one of its main objectives has been to standardise the various training courses, and to band together such trained women in order to secure recognition of its members as suitable for both hospital posts and for nutrition work in other spheres. All training centres are visited periodically by a subcommittee whose recommendations for raising the standard have already been acted upon by some of the colleges and hospital departments. To some extent this advisory work was interrupted by the war when several of the centres were closed down for a time.

From the beginning the association has demanded qualifications from its members which definitely embody more than "domestic science plus 'doing time' in a hospital diet kitchen." In the past no doubt students with a BSC degree were able to qualify by taking six months training in a hospital dietetic department, but now all students must take a diploma in dietetics with a course lasting from 1 to 1½ years. The preliminary training may vary from a BSC degree including physiology and chemistry, to a full nursing training or a domestic science diploma of high standard. But it must be followed by six months in a hospital dietetic department amplified by work in the outpatient clinics and sometimes by research in nutritional problems and social welfare.

Further development of the training to meet present day requirements is under consideration, and the Association would welcome the coöperation of all concerned. The training provided in the initial stages for a new profession was bound to be experimental.

British Dietetic Association, Pool-in-Wharfedale. ELSPETH M. AVERILL, Chairman.

EVALUATION OF GASTROSCOPY

SIR,—There will be no disagreement with Air-Commodore Conybeare's observation (May 29) that the findings of the amateur gastroscopist are apt to be misleading. But his contention that it takes a real expert to judge when a gastroscopic examination is required must be challenged. Schindler[1] gives indications under twelve headings for gastroscopy. Most gastroscopists in this country, having had less experience than Schindler, would not agree to all these indications for routine work. The following, however, may be accepted as absolute indications for gastroscopy:—

1. Cases of chronic dyspepsia in which the diagnosis is doubtful after gastro-duodenal X ray.
2. Gastric ulcer. 3. Hæmatemesis.

There are also numerous relative indications.

A sound clinician, who may or may not be an expert gastroscopist, can make up his mind whether the symptoms are dyspeptic, whether there are systemic or extra-gastroduodenal causes for the dyspepsia or hæmatemesis; and subject to certain contra-indications can then advise gastroscopy with the prospect of obtaining thereby useful information. It should be no more difficult to select cases for gastroscopy than for radiology. He will note that gastroscopy does not supplant a sound clinical estimation of the patient, or the use of radiology; in fact gastroscopy makes for more careful clinical observation and better radiology than might otherwise obtain.

Dr. Conybeare holds that gastroscopy can only be done on inpatients; but I have gastroscoped large numbers of civilian and Service cases as outpatients, and have confirmed the truth of Schindler's remark that "if the patient comes without attendants, he may go home alone provided the trip is not too difficult."

Gastro-enterology already owes a big debt to gastroscopy, if only for the enthusiasm and interest it has excited in the study of dyspeptics who previously were, perhaps, not receiving the attention they deserved. Whether this enthusiasm is found in the young or the old does not matter much, so long as it is there.

Ipswich. RONALD JONES.

TUBAL INSUFFLATION AFTER GONORRHŒA

SIR,—After the successful treatment of gonorrhœa with sulphonamides it is important to be sure that the woman is not left with closed fallopian tubes. Administration of these drugs in adequate doses will not always prevent an inflammatory reaction which occludes the lumen and so causes sterility. The risk is, of course, greater if dosage is insufficient.

Of 10 women on whom I have performed tubal insufflation within 3–6 months of apparent cure of gonorrhœa, 6 had blocked tubes. Among these 6 there were 2 with a history of abortion, and the tubes remained blocked; but in the other 4 they became patent again after two or three insufflations. The following are examples:

CASE 1.—A woman of 29 contracted gonorrhœa and was treated with sulphapyridine, gr. 5, daily for four days, and 3 g. daily for a further three days. After a week cervical and vaginal discharge became negative for gonococci. She was kept under observation for a further two months, and then married; three months later she complained that she was not yet pregnant. Her husband showed normal spermato-

1. Schindler, R. Gastroscopy, Chicago, 1937.

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genesis. As there was no sign of inflammation I did a tubal insufflation and found both tubes blocked. A fortnight later I did a second insufflaton, during which the pressure rose to 200 mm. Hg and then abruptly dropped to 110 mm. Two hours afterwards the patient complained of shoulder pain, and three weeks later she became pregnant.

CASE 2.—A woman of 26 was treated with sulphathiazole, and smears taken during the next two months were free from gonococci. After another three months—having convinced myself by clinical examination, by provocative treatment, and by the sedimentation-rate, that there was no inflammation present—I insufflated the tubes, keeping the pressure below 180 mm. Hg. A fortnight later I repeated the insufflation, allowing the pressure to rise to 200 mm. Hg; three weeks after this, at a third insufflation, the pressure fell from 180 to 110 mm. Hg and shoulder pain followed, which showed that the tubes had become patent.

No conclusions can be drawn from these few cases, but the results seem to justify further investigation on the same lines. It seems to me that no woman with gonorrhœa should be pronounced cured until the tubes have been examined; and if they are closed, I suggest that tubal insufflation should be undertaken within 3–6 months of the apparent cure, provided that (i) the sedimentation-rate is normal; (ii) the cervical and vaginal secretions have been free from gonococci for at least three months; (iii) there are no detectable signs of inflammation of the tubes; and (iv) no focal or general reaction follows provocative treatment.

The pressure should not be allowed to rise higher than 170 mm. Hg during the first insufflation. If there is no local reaction the second insufflation should be performed a fortnight later, when the pressure may be allowed to rise to 200 mm. Hg.

Wimpole Street, W.1. E. SCHLEYER.

FLUORINE IN DRINKING WATER

SIR,—Spira and Grimbleby have lately suggested that fluorine can easily be removed from drinking-water by boiling it for 5 minutes (*J. Hyg., Camb.* 1943, **43**, 141). It would be misleading to assume that this is true for all waters. It is in fact extremely difficult to remove fluorine from some samples of water, as many attempts to do so in the United States have shown. We found that the fluorine content in parts per million of tap water from Maldon, Essex, was as follows: as drawn from the tap, 4·5; boiled in glass for 5 minutes, 4·5; left over calcium carbonate for a day, 3·5; left over 'Doucil' water-softener for a day, 4·0. The fluorine content of a hard water from Luxborough, Somerset, was 0·95 p.p.m. before boiling and 0·85 after boiling for 5 minutes. A soft water from Meldon Quarries, near Okehampton, Devon, contained 0·45 p.p.m. before boiling and the same after boiling for 5 minutes. The determinations were made by the zirconium-alizarine colorimetric method, after the precipitation of interfering salts by barium chloride.

M. M. MURRAY,
Oxford. D. C. WILSON.

DOCTORS AND THE FUTURE

SIR,—My friend Dr. Raymond Greene takes you to task, rightly I think, for sitting on the fence in your leader of June 5. He is right also in saying that we must run our own show. Nobody, so far as I know, has suggested that lawyers, for example, should be controlled by persons outside their profession. We must remember, however, that our show comprises not only doctors but also patients, actual or potential; for that reason our controlling body, corporation or council—call it what you will—must represent laymen as well as doctors, and the best type of lay representative would clearly be of the stuff of which hospital chairmen are made—i.e., persons of good repute, of high administrative ability, with a genuine interest in medical service and with no conceivable axes to grind. I agree with Dr. Greene that we are unlikely to be able to work happily under either the Ministry of Health or local authorities, but I cannot agree that dictatorships conduce either to administrative efficiency or to the happiness of the masses. Dictatorship has a way of going to the head of the dictator.

So far as general practice is concerned, 20 years' experience has convinced me that what really matters is a proper understanding between patient and doctor. The doctor, however tired, must at all times be prepared to do his best for all patients, however trying. He must laboriously gain their confidence and teach them neither to be absurdly apprehensive about trivial symptoms nor to make frivolous or vexatious demands upon his time or energy. Once such an understanding is established the doctor can snap his fingers at the forces of bureaucracy and his patients will back him up. I can imagine nothing more satisfactory than to be in a position to say to a pettifogging inspector, "so you don't think I look after my patients properly, don't you? Well, go round and tell them so and see what happens to you."

Crediton, Devon. L. N. JACKSON.

REHABILITATION OF THE TUBERCULOUS

SIR,—It was with keen pleasure that I read Dr. Wollaston's note in your issue of June 12, more particularly since it emanated from Papworth. The policies of Papworth and Preston Hall are (as Dr. H. A. Pattison says in his recently published *Rehabilitation of the Tuberculous*) alike except in one very important respect. The late Sir Pendrill Varrier-Jones believed that the tuberculous should be cared for *permanently* in village settlements; I have taken the view that in the majority of cases of pulmonary tuberculosis who have enjoyed three to five years' freedom from signs or symptoms of active disease under village settlement conditions, the liability of relapse is very slight. Our policy at Preston Hall has been to encourage such patients to leave the settlement houses in order to make openings for new applicants.

In this view I have the support of the majority of my colleagues, including Dr. Pattison, whose experience in the United States has been practical and extensive. Radiological shadows ought never to be taken, *by themselves*, as a guide to treatment; but radiological shadows considered in relation to the tolerance of a patient over a number of years to graduated exercise under medical supervision constitute a guide which is of the greatest value to those of us engaged in village settlement work and one which is denied to many of our colleagues without similar facilities for assessing "the patient" as distinct from "the disease." The policy of keeping arrested lesions in a state of permanent arrest by perpetual residence in a village settlement is likely to lead to stagnation in the village settlement by limiting the admission of further patients who are in fact suffering from disease which requires prolonged treatment and the complete rehabilitation devices which the settlement provides.

Except by the expensive process of building more and more houses, no new cases can be taken into the village settlement so long as places are being occupied by groups of men for whom there are no longer any solid medical grounds for continued residence in the settlement.

Preston Hall, Kent. JOHN B. MCDOUGALL.

PROMIN AND PROMANIDE

SIR,—Since the publication of the article entitled Tuberculosis treated with Promin in your issue of June 5, I have been informed by Dr. Stanley White that 'Promin' (PDCo) will be designated as 'Promanide' in this country. He also tells me that the strength of the glycerin paint prepared for me by his firm was 20% promanide in 50% glycerin. May I add that this paint was applied for me by Dr. J. Vahrman once or twice daily directly to the affected part of the larynx viewed through a laryngeal mirror. No anæsthetic was needed as the patients soon tolerated the treatment. I should have written *viscous* rather than oily vehicle as promanide is insoluble in oil, but soluble in glycerin.

County Hall, S.E.1. FREDERICK HEAF.

The Anglo-Soviet Medical Council have a few spare copies of the *Medical Chronicle* published by the medical section of VOKS (the USSR society for cultural relations with other countries). The issue available is no. 4, December, 1942, the latest issue so far received. Copies (6*d.* post free) may be had from the Secretary of the A-SMC, at the Royal Society of Medicine, 1, Wimpole Street, London, W1.

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Public Health

VITAMIN C IN SCHOOL-CHILDREN

W. W. PAYNE, MB LOND, MRCP
BIOCHEMIST TO THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET, AND TO THE EMERGENCY MEDICAL SERVICE

AFTER the study of vitamin-C saturation in a group of hospital children in the winter of 1940–41 (Payne and Topley [1]) it was decided to make a further study in normal school-children.

Two methods of investigation were used. The first was to make saturation tests on a series of school-children. The technique adopted was to take 10 boys between 10 and 13 years and starting on a Monday, give a dose of 50 mg. of ascorbic acid per stone of body-weight daily, until satisfactory saturation had been demonstrated by the presence of at least 7 mg. of ascorbic acid per 100 c.cm. of urine passed in the period between 3 and 5 hours after the dose. A fresh group of boys was taken each week starting in December and the investigation was continued until the end of the spring term.

In the second method two school forms were chosen—one of boys and one of girls, aged between 11 and 12 on an average. About 40 children were in each form. In this school each age-group was already graded into A, B, C and D standards according to scholastic merit and behaviour. A-standard children were the best in intelligence and behaviour; B-standard children were thought to be capable of attaining A standard but were falling short of it for some reason; those of C standard were ordinary average children, and those of D standard were dunces. B-standard forms were chosen as being the most likely to show improved performance or behaviour. To half the children of each form 50 mg. of ascorbic acid was given daily; to the other half dummy tablets were given. Which half was having the active tablets was known only to the headmaster and headmistress.

At the beginning and at the end all the children were given a thorough examination by Dr. C. E. Field and Dr. A. W. Franklin. The progress of the groups was compared by the respective headmaster and headmistress at the end of the spring term with regard to alteration in behaviour, alteration in position in class and number of days absent through illness. It was unfortunately not possible to apply the saturation test to these groups of children.

RESULTS

Saturation tests.—Table I shows the number of days taken to saturate the boys in the months of December to March. Using Harris's criterion of saturation [2] within 3 days as being satisfactory, it will be seen that, taking the whole period, 86% of the boys were having enough ascorbic acid.

TABLE I—NORMAL SCHOOL-CHILDREN

1941–42	Cases	Cases saturated on days				Not saturated (duration of test in parentheses)	% saturated in 3 days
		1	2	3	4		
December ..	17	4	12	1	0	0	100
January ..	27	10	7	4	3	2 (4 days); 1 (3 days)	78
February ..	40	15	15	7	3	0	92
March ..	28	3	11	7	4	3 (4 days)	75
Dec.–March	112	32	45	19	10	..	86·5

A control group of children in hospital was tested, to compare with the results of the previous year's test. It will be seen that the results are much worse than in the healthy groups and slightly worse in 1941–42 than in 1940–41 (table II); the same sort of thing has been found among other groups of children in different parts of the country by Harris (1942). The tests were made at the same time of the year in all cases.

Feeding tests.—The reports of both headmaster and headmistress agreed; no difference in behaviour could be detected by the form teachers.

Place in class—
Girls—no change.
Boys—average position { Vitamin group — 1 / Control + 2

Absence through illness—
in both boys and girls the percentage was identical in each group.

Parents' comments—
Vitamin-fed group, 2 reported improvement; no adverse effects reported.
Control group, no improvement reported but 2 reported vomiting and attributed it to the tablets.

Medical examination—
Dr. Franklin reported that he found no difference between the two groups of boys at either the beginning or at the end of the test.
Dr. Field reported no difference in the two groups of girls at the beginning. At the end of the test the only difference observed was a slight injection of the mucous membrane of the anterior aspect of the lower tooth sockets in some cases in the control group. She was rather doubtful of its significance.

Urines examined before and after showed no alteration in the minor abnormalities found (albumin or sugar) and no red cells were present at any time.

TABLE II—CHILDREN FROM THE WARDS OF A CHILDREN'S HOSPITAL

—	Cases	Saturated in 3 days	Saturated in 6 days	Not saturated	% saturated in 3 days
1940–41	18	7	4	7	39
1941–42	30	7	12	11	23

DISCUSSION

These results may on the whole be regarded with satisfaction as indicating a reasonably good standard of vitamin-C nutrition considering the difficulties of wartime. The school was situated in the outskirts of a semi-industrial town and served a well-developed housing estate. The usual school meal was supplied (it was one of the schools mentioned by Booth and his colleagues [3]); the school had no garden.

Supplementary feeding with ascorbic acid produced no detectable improvement in the children. This may be taken as supporting evidence that the Harris saturation-technique gives results in conformity with nutritional needs.

SUMMARY

Saturation tests have been performed on school-children during the winter months and showed a fair degree of saturation. A group of children was fed 50 mg. ascorbic acid daily and their behaviour and physical health were compared with those of a control group. No material difference in these respects could be detected at the end of four months.

I wish to thank Mr. Tovey, the headmaster, and Miss Clifford, the headmistress, for their help; the Hertfordshire county council education committee for permission to do the work; and Dr. Field and Dr. Franklin who so kindly examined the children. Miss B. Kettle was responsible for most of the urinary ascorbic acid estimations. The ascorbic acid was supplied by Roche Products Ltd.

1. Payne, W. W. and Topley, E. *Lancet*, 1941, ii, 596.
2. Harris, L. J. *Ibid*, 1940, ii, 259.
3. Booth, R. G., James, G. V., Marrack, J. R., Payne, W. W. and Wokes, F. *Ibid*, 1942, ii, 569.

From the School Reports

SCABIES

Dr. Meredith Davies of *Devon* calls attention in his school report for 1941 to overcrowding in schools in reception areas. In Devon, the native children numbered 38,000 and official evacuees 26,000. This overloading may have something to do with the increase in skin diseases—compared with 1940, scabies increased 2½ times and impetigo and other skin conditions doubled, while the difference in incidence between native and evacuated children, so well-marked at first, was reduced. The increase of scabies in school-children in 1941 was serious

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and widespread. In *Colchester*, the numbers in the three years 1939–41 were 17, 27, 131. In *Stockport*, there were 153 cases in 1940 and 346 in 1941. In *Leicester* the numbers recorded annually since 1934 were 54, 67, 143, 215, 371, 445, 738, 2637. Dr. E. K. Macdonald calls attention to the fact that in Leicester, as in all other parts of the country, the rise in scabies started in 1936; so the pandemic cannot be accounted to anything connected with the war, though war-time conditions undoubtedly favour its spread. In *Northampton*, where there were about 10,000 children on the registers, of whom about 4000 were evacuees, 752 cases of scabies, 310 in the evacuees, were treated at the clinics against 192 in 1940. In *Kettering* among about 42,000 school-children there were 481 cases of scabies. As elsewhere, the incidence was higher among evacuees than among native children, but the difference is rapidly diminishing. In *Exeter*, the known incidence of scabies, which in 1940 was 288 cases in 167 families, increased to 950 cases in 468 families in 1941. Generally in our school-children there was an increase in impetigo and a lowering of the standard of freedom from head lice in 1941, but nothing to be compared with the increase of scabies. The rise in scabies is not limited to the reception areas, nor is it greater in them than in evacuation areas, and, though reliable figures for other sections of the population are not available, it appears to be no greater in school-children than in other people.

TUBERCLE

There will be special interest in the returns of tuberculosis in school-children in the next few years, especially of early pulmonary tuberculosis, for with improved X-ray facilities detection of the disease before the onset of definite symptoms should be possible and three important points at present doubtful can be finally cleared. The first is whether adolescent phthisis starts before puberty; the second, whether the condition of chronic indifferent ill health, formerly called pre tuberculosis, has anything to do with tuberculosis; the third, whether hilum tuberculosis—direct extension of lesion from the bronchial glands to the lungs—is a reality. Dr. Ash of *Derbyshire* gives a table of cases of non-pulmonary tuberculosis in persons under 25 years of age since 1937 arranged in the six age-groups. In the two age-groups below 5, the incidence shows no trend in either direction, but in the other four groups the incidence, after dropping to a low level in 1940, rose sharply in 1941. In 1940, 81 cases of non-pulmonary tuberculosis were detected in children aged 5–25; in 1941, the number was 139. In *Carlisle*, 70 children of school age were referred to the tuberculosis officer—11 notified cases, 30 suspects and 29 contacts. Three were found to have pulmonary tuberculosis, 12 other forms and 55 showed no evidence of tuberculosis. In addition, 5 evacuees were notified, 2 pulmonary and 3 other. In *Southampton* 6 cases of pulmonary and 11 of other tuberculosis in school-children were notified. In *Croydon* among school-children the pulmonary tuberculosis mortality was 6·5 and the incidence 19·5 per 100,000. The non-pulmonary rates were 51·9 mortality and 136·4 incidence. Dr. Holden says that the non-pulmonary rates show a considerable increase "but this may be more artificial than real owing to the fluctuation in numbers due to evacuation." In *Leicester* 2 definite and 51 suspected cases of pulmonary tuberculosis were found in school-children in 1941.

From the Annual Reports

Preliminary reports show 1942 to have been a very healthy year, nearly equal to 1938 and with none of the fears of prolonged war so far realised. The birth-rate was the highest since 1933, but was still less than three-quarters of that required to keep the population at the present level. The death-rate was the lowest but one so far recorded; presumably this does not take into account members of the Services who died abroad. The heavy death-roll of old people from the severe winter of 1940 would automatically lower the death-rate for two or three years by eliminating those most ready to die, if circumstances remained the same; but the low mortality from infectious diseases which helped to keep down the general death-rate of 1942 is altogether favourable. The year was extraordinarily free from epidemics. The trend of tuberculosis was downwards, but this does not remove our anxiety though it somewhat allays it. Syphilis is the blackest spot, but syphilis is a curable disease and if we can maintain facilities for treatment and the people respond to the present appeals the rapid increase in primary infections should not lead to future grave syphilitic manifestations. Some of the favourable mortality statistics of 1942 can be accounted to improvement in therapeutics, chiefly to the sulphonamides. The suspension of severe air-raids removed the danger of typhoid. Even after the severe bombing of 1940–41, which caused much anastomosis between the water-supply and the sewerage system, there was very little typhoid. This rather suggests that carriers of typhoid are not numerous; but experience of water-borne typhoid is that extensive pollution is less dangerous than slight fouling which does not interfere with potability and can be discovered only by analysis. However, the absence of typhoid outbreaks in towns after severe bombing tells us that even the most desperate dangers can be frustrated if we are ready to deal with them at once.

So far, the severest disease of the war period has been whooping-cough. This may be only because the disease has been made notifiable and attention has been drawn to it. A good case has been made out for preventive inoculation, the validity of which now seems to be established. Since whooping-cough is worst in the first years of life, prevention must be practised in early infancy. The results to be expected are not comparable with those from diphtheria immunisation, but roughly it will reduce the attack-rate to about a third and fatality to about a quarter. There was a well-marked increase in recognised infective hepatitis, or catarrhal jaundice. This disease has always been more common than records show, for until recently the health departments took no interest in it, though the school medical service often came across local outbreaks. Outbreaks of infective hepatitis have been somewhat frequent in the Services. The fall in epidemic prevalence of cerebrospinal fever was slower and less steep than many of us hoped, but the epidemic in the last war was also very tardy in collapsing and the disease never returned to the low prevalence ruling before 1913. During the present year the incidence has been declining more rapidly, whereas in 1942 it increased in the late winter. The results of treatment remain constant with a fatality of 20% of notifications. We should not rest contented with this. Some physicians still withhold sulphonamide treatment from cases which are apparently moribund when first seen, but there are many recorded instances of dramatic recovery in persons not expected to live more than an hour or so. Perhaps the most remarkable health phenomenon of 1942 was the rarity of food-poisoning and diseases spread by food. There was no malnutrition of clinical significance attributable to shortage of food elements.

Infectious Disease in England and Wales

WEEK ENDED JUNE 12

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1966; whooping-cough, 2063; diphtheria, 607; paratyphoid, 6; typhoid, 5; measles (excluding rubella), 6724; pneumonia (primary or influenzal), 637; puerperal pyrexia, 143; cerebrospinal fever, 50; poliomyelitis, 5; polio-encephalitis, 2; encephalitis lethargica, 3; dysentery, 127; ophthalmia neonatorum, 97. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on June 9 was 1828. During the previous week the following cases were admitted: scarlet fever, 187; diphtheria, 46; measles, 76; whooping-cough, 40.

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (1) from scarlet fever 3 (1) from measles, 14 (1) from whooping-cough, 7 (3) from diphtheria, 51 (9) from diarrhœa and enteritis under two years, and 16 (0) from influenza. The figures in parentheses are those for London itself.

Manchester and Birmingham each reported 5 deaths from whooping-cough. Liverpool and Manchester both had 5 fatal cases of diarrhœa.

The number of stillbirths notified during the week was 219 (corresponding to a rate of 31 per thousand total births), including 21 in London.

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TRADE NAMES OF SULPHONAMIDES AND SULPHONES

IN his paper in THE LANCET eighteen months ago (1941, ii, 625) D. G. Ardley brought some order to the chaos of chemotherapeutic nomenclature, but since then new compounds have continued to spring up, and worse still new names have continued to be applied to old compounds. The following list brings Ardley's up to date. Sulphonamides without a trade name—e.g., sulphadiazine—do not appear.

It will be seen that the 42 names for sulphanilamide that Ardley collected—"among which collectors may find choice and rare specimens"—have now grown to 54, and the end is not yet in sight. Has not the time come for manufacturers to sacrifice their trade names for this compound (and perhaps for some others) and content themselves with the label "Sulphanilamide Robinson," or "Sulphanilamide Jones"?

Trade Name	*Other Name*
Albosal	Sulphanilamide
Albucid	Sulphacetamide
Albucid soluble	Sodium sulphacetamide
Aldanil	Sulphanilamide sodium formaldehyde sulphoxylate
Ambesid	Sulphanilamide
Ambesid soluble	Sodium succinyl sulphanilamide
Antistrept	Sulphanilamide
Astreptine	Sulphanilamide
Bacteramide	Sulphanilamide
Bactesid	Sulphanilamide
Bayer 102	Azosulphamide (Disodium 4'-sulphonamide phenyl 2-azo-1-hydroxy-7-acetyl-amino-naphthalene-3 : 6-disulphonate)
Cepticide	Sulphanilamide
Ciba 3714	Sulphathiazole
Cibazol	Sulphathiazole
Coccoclase	Sulphapyridine
Collomide	Colloidal sulphanilamide
Colsulanyde	Sulphanilamide
Dagenan	Sulphapyridine
Dagenan sodium	Sodium sulphapyridine
D.B. 32	Disulphanilamide (Sulphanilyl sulphanilamide)
D.B. 87	Monomethyldisulphanilamide. (Sulphanilyl-methylsulphanilamide)
D.B. 90	Sulphanilyldimethyl sulphanilamide
D.B. 373	Sulphanilyldimethyl sulphanilamide
Dermoseptasine	Disodium-*p*-(γ-phenylpropylamino)-benzene-sulphonamido-α-γ-disulphonate ointment
Deseptyl	Sulphanilamide
Diseptal A	Sulphanilyldimethyl sulphanilamide
Diseptal B	Sulphanilylmethyl sulphanilamide
Diseptal C	Disulphanilamide
Disulon	Disulphanilamide
Disulon sodium	Sodium disulphanilamide
Ergaseptine	Sulphanilamide
Erysipan	Sulphanilamide
Estreptocida	Sulphanilamide
Eubasin	Sulphapyridine
Eubasinum	Sulphapyridine
F. 1162	Sulphanilamide
F. 1399.,	Di-(*p*-acetyl-amino-phenyl)-sulphone
Globucid	Sulphanilamido-ethyl thiodiazole
Gombardol	Sulphanilamide
Guamide	Sulphaguanidine
Irgamid	N,-dimethylacreyl sulphanilamide
Lutazol	Lithium *p*-sulphonamido-phenyl-azo salicylate
Lysococcine	Sulphanilamide
M 109	Sodium sulphanilamide methylene sulphonate
M 541	Sulphanilamide ethyl sulphonate
M & B 125	Benzyl sulphanilamide
M & B 137	Disodium-*p*-(γ-phenyl-propylamino)-benzene-sulphonamido-α-γ-disulphonate
M & B 693	Sulphapyridine
M & B 693 soluble	Sodium sulphapyridine
M & B 760	Sulphathiazole
M & B 760 soluble	Sodium sulphathiazole
M & B 838	Sulphamethylthiazole
Marfanil / Mesudin	4-amino methyl benzene sulphonamide
Neococcyl	Sulphanilamide
Neoprontosil	Azosulphamide
Neostrepsan	Sulphathiazole
Neostreptosil	Sulphanilylacetyl sulphanilamide
Neouleron	Disulphanilamide
Nisulfadine	2-(*p*-nitrobenzene-sulphonamido) pyridine
Nisulfazole	2 (*p*-nitrobenzene-sulphonamido) thiazole
Novamide	Sulphanilamide sodium methylene sulphonate
Orgaseptine	Sulphanilamide
P.A.B.S.	Sulphanilamide
Promin	Sodium *p.p*-diamino-diphenyl-sulphone-N,-N'-didextrose sulphonate
Prontosil II	Azosulphamide
Prontosil album	Sulphanilamide
Prontosil flavum	Sulphonamido-chrysoïdin (4'-sulphonamido-2 : 4-diaminoazobenzene
Prontosil red	Sulphonamido-chrysoïdin
Prontosil rubrum	Sulphonamido-chrysoïdin
Prontosil S	Azosulphamide
Prontosil soluble	Azosulphamide
Prontylin	Sulphanilamide
Pronzin album	Sulphanilamide
Pronzin rubrum / Pronson rubrum	Sulphonamido-chrysoïdin
Proseptasine	Benzylsulphanilamide
Proseptine	Sulphanilamide
Proseptol	Sulphanilamide
Pyriamid	Sulphapyridine
Pysococcine	Sulphanilamide
Rodilone	Di-(*p*-acetyl-amino-phenyl)-sulphone
R.P. 40	Disodium-*p*-(γ-phenyl-propylamino)-benzene-sulphonamido-γ-disulphonate
R.P. 46	Benzylsulphanilamide
R.P. 2090	Sulphathiazole
Rubiazol	6-carboxy-sulphonamido-chrysoïdin (4'-sulphonamido-2 : 4-diamino-6-carboxyazo-benzene)
Rubiazol A	Sulphanilamide
Rubiazol Injectable	Azosulphamide
Salazopyrin	Salicylazosulphapyridine (*p*-benzene-sulphonyl-amino-α-pyridine) azosalicylic acid
Sanamide	Sulphanilamide
Septamide album	Sulphanilamide
Septanilam	Sulphanilamide
Septazin	Benzylsulphanilamide
Septazine	Benzylsulphanilamide
Septinal	Sulphanilamide
Septinal soluble	Sodium succinyl sulphanilamide
Septipulmon	Sulphapyridine
Septoplix	Sulphanilamide
Setazine	Benzylsulphanilamide
Soluseptazine / Soluseptazin / Soluseptazine	Disodium *p*(γ-phenyl-propylamino)-benzene Sulphonamido-α-γ-disulphonate
Stopton album	Sulphanilamide
Stramide	Sulphanilamide
Strepamid	Sulphanilamide
Strepsan	Sulphanilamide
Streptal	Sulphanilamide
Streptal soluble	N⁴-quinolinyl sulphanilamide
Streptamide	Sulphanilamide
Streptasol	Sulphanilamide
Streptazol	Sulphanilamide
Streptocide	Sulphanilamide
Streptocid album	Sulphanilamide
Streptocid rubrum	Azosulphamide
Streptocide	Sulphanilamide
Streptoclase	Sulphanilamide
Streptocom	Sulphanilamide
Strepton	Sulphanilamide
Streptozone	Sulphanilamide
Streptozon S	Azosulphamide
Substance 33	Sodium potassium *p*-sulphonamido-phenyl-azo salicylate
Sulamyd	Sulphacetamide
Sylamyd soluble	Sodium sulphacetamide
Sulfacet	Sulphacetamide
Sulfacetimide	Sulphacetamide
Sulfamidyl	Sulphanilamide
Sulfana	Sulphanilamide
Sulfanil	Sulphanilamide
Sulfasuxidine	Succinyl sulphathiazole
Sulphabenamide	Caproylaminobenzene sulphonhydroxamide
Sulphacid	4-amino-4'-ureido-diphenyl sulphone
Sulphadine	Sulphapyridine
Sulphanalone	Sulphanilamide
Sulphanilamide LSF	Sulphanilamide lactoside sodium formaldehyde sulphoxylate
Sulphidine	Sulphapyridine
Sulphocidine	Sulphanilamide
Sulphonamide EOS	Sodium sulphanilamide N-ethyl sulphonate
Sulphonamide-P	Sulphanilamide
Supron	Sulphanilamide
Therapol	Sulphanilamide
Thiazamide	Sulphathiazole
Thiazamide sodium	Sodium sulphathiazole
Toriseptin-M	Sulphamethylthiazole
Uleron, Ulirone	Sulphanilyl-dimethyl sulphanilamide
Ultraseptyl	Sodium sulphamethylthiazole
V.K. 57	Sulphaphamide isopropyl-thiodiazole

MEDICAL HONOURS.—In addition to those named in our issue of June 12 (p. 750) the following officers of the medical branch of the RAF were included in the Birthday Honours list:

MBE.—Flight-Lieutenants G. D. Graham and N. Livingstone.

Mentioned in despatches:—Air Vice-Marshal A. E. Panter, KHS, Group-Captains C. T. O'Neill, OBE, and C. J. S. O'Malley; Wing-Commanders Leonard Freeman, J. P. Huins, OBE, R. Thorpe, J. H. Williams, O. S. M. Williams, R. W. Durand, and J. S. Wilson; Squadron-Leaders H. S. Barber, D. Glanville Evans, W. A. S. Falla, K. B. Redmond, A. Wilson, A. L. J. Dovey, R. G. D. Forward, R. G. Griffiths, William Hopkin-Jones, and David Stafford-Clark; Flight-Lieutenants O. T. Brown, W. G. Farrell, Thomas Hepburn, J. L. Morgan and A. Russell.

The following awards have been made to officers of the RAMC:

DSO.—Captain J. W. Logan, MB GLASG.

MC.—Captain J. D. Dow, MB GLASG., Captain E. J. Kerr, MB BIRM., and Lieutenant R. G. Boyd, MB BRIST.

GUESTS OF THE PILGRIMS.—The Medical Pilgrims entertained representatives of the medical services of the United Nations at dinner on June 12. The following were the guests: Major-General Sir Henry Tidy (president of the Association of British Physicians), Dr. Gordon Holmes, Lieut.-Colonel Colin Ross (Australia), Colonel L. C. Montgomery (Canada), Major H. D. Robertson (New Zealand), General P. R. Hawley and Colonel W. S. Middleton (USA), Prof. S. A. Sarkisov (USSR), Major Gallemaerts (Belgium), Dr. P. W. Lamb (China), Colonel Franlisek Langer (Czecho-Slovakia), Médecin-Commandant Ségal (France), Dr. A. P. Cawadias (Greece), Lieut.-Colonel C. F. Koch (Holland), Prof. Kojen (Yugo-Slavia), Prof. Johan Holst (Norway) and Colonel H. Szczodrowski (Poland).

UNIVERSITY OF SHEFFIELD.—Mr. W. J. Lytle has been appointed lecturer in surgery in the university.

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Notes and News

A SCHEME FOR CHILD HEALTH

Now, when the national re-planning of social services is receiving serious consideration, a body of people specially interested in the health and well-being of the child and adolescent have bound themselves together under the name of the Child Health Planning Group. The group is a voluntary organisation, comprising men and women of all types of occupation and profession and free from any specific political or other associations. They believe that three interdependent sets of factors are essential for the physical and mental well-being of the child, these being briefly included under home environment, school and working environment, and the provision of health services.

Home environment is taken to cover such wide aspects as town and country planning, housing, economic security, good food, protection and provision for neglected and delinquent children, and opportunity for harmonious family life. The educational side includes not only teaching according to the child's capacity and bent, but good physical and hygienic surroundings, adjustment of work to the individual's mental and physical well-being, and facilities for the best use of leisure. The provision of a national medical service is understood to comprise continuous surveillance for the promotion of health and prevention of disease, with access to all modern facilities, preventive and curative.

Seven regional units have been set up, within which area sub-groups will be organised according to geographical convenience. At the inaugural meeting of the Yorkshire group Prof. C. W. Vining described the bringing up of children as nearly a 24-hour job, and suggested that one serious problem was the parent with retarded intelligence. The intention is to arrange in all the groups for periodical specialist meetings, open to all members to attend. The preliminary document put out by the group is signed by six medical men and women, with Dr. J. D. Kershaw of Accrington (NW region) as hon. general secretary.

University of Oxford

Prof. Arthur Ellis has been elected a member of the General Medical Council.

In a congregation held on June 12 the following degrees were conferred in absentia:

BM, BCh—T. P. Morley, N. B. Myant, A. E. Mourant, R. H. Cowdell, and J. N. Macbeth.

Medical Society of London

A clinical meeting will be held at St. Mary's Hospital, Paddington, W.2 on Monday, June 28, at 4.30 PM, and a discussion will follow at 5.30.

Paddington Medical Society

On Tuesday, June 29, at 9 PM, at St. Mary's Hospital, Paddington, W2, Dr. Z. Green will deliver his presidential address on some tragedies and comedies in twenty years of general practice.

National Association for the Prevention of Tuberculosis

The Minister of Health will open a conference on Wednesday, July 28, at Tavistock House North, London, W.C.1, when the new mass radiology scheme and financial allowance for the tuberculous will be discussed.

Tata Memorial Trust

The following awards will be made by the trust for research in blood diseases, with special reference to leukæmia, in October.

Grants for research expenses.—Dr. J. Furth (New York), Dr. P. A. Gorer (London), Dr. A. H. T. Robb-Smith (Oxford), and Prof. L. Doljanski, PH D (Jerusalem).

Part-time personal grant and grants for assistance and research expenses.—Dr. Warner Jacobson (Cambridge).

Westminster Hospital

At the beginning of the session the inaugural address will be delivered by Mr. Ernest Brown, Minister of Health, on Monday, Oct. 4, at 3 PM.

Royal College of Physicians of Edinburgh

On Friday, July 2, at 5 PM, Sir Henry Dale, PRS, will deliver a Frederick Price lecture entitled A Prospect in Therapeutics.

First Aid Film

On Saturday, July 3, at 3 PM, at the County Hall, Chichester, Surgeon Rear-Admiral C. P. G. Wakeley will present a talking film illustrating first-aid in the Navy. The meeting will be open to doctors and the ARP, Civil Defence and medical ancillary services.

Pensions

Sir Walter Womersley, Minister of Pensions, speaking at Bury, Lancs, on June 20, said that after this war Servicemen will not be able to commute pension into a lump sum as they were entitled to do after the last war.

Local Government

At the Labour Party conference on June 17 the executive's proposals on local government, carried by a 3-to-2 majority, included the division of the country into regions large enough for efficient planning and administration.

Royal Institute of Public Health and Hygiene

On Thursday, July 8, at 3 PM, Prof. J. W. Eyre will preside over a reception at 28, Portland Place, London, W.1, when the Harben medal will be presented to Sir Henry Dale, PRS, and the Smith award to Dr. James Fenton.

Public Health in the USSR

Sir Henry Tidy, president of the Royal Society of Medicine, has sent the following greeting to Prof. George Mityerov, the People's Commissar for Public Health of the USSR:

On behalf of the 6000 fellows of the Royal Society of Medicine, which has concerned itself with the science and culture of medicine since the year of its foundation in 1805, and which has actively concerned itself with matters regarding public health, I have the honour to congratulate the People's Commissariat of Public Health on the 25th anniversary of its foundation and to wish it all prosperity and ever-growing success. May the great work which it has achieved in raising the standard of public health in Russia during the last twenty-five years be amplified and improved at an ever-increasing rate both now and in the time that is to come when the defeat of the Axis, due to the joint efforts of the Allied Nations will set free all our energies for the betterment of the lot of humanity.

Appointments

HANAN, G. F., MB EDIN.: examining factory surgeon for Mevagissey, Cornwall.

JONES, V. EMRYS, MB LOND. and LPOOL: medical superintendent at Glan Ply Hospital.

MAXWELL, B. M., MD BELF., DMRE: radiologist to the Norfolk and Norwich Hospital.

NAZ, L. P., MRCS: resident surgeon at St. Helier County Hospital, Carshalton.

TATTERSALL, NORMAN, MD LOND., MB MANC: PMO of the Welsh National Memorial Association.

Births, Marriages and Deaths

BIRTHS

EAST.—On June 14, at Southborough, the wife of Dr. Cecil East—a son.

FISHER.—On June 14, at Capetown, to Dr. Monica Fisher (née Hanford), wife of Dr. Charles Fisher, of Luanshya, N. Rhodesia—a son.

GRANT.—On June 12, the wife of Dr. John Grant, of Orpington, Kent—a son.

LALONDE.—On June 15, the wife of Dr. T. P. Lalonde, of Romsey, Hampshire—a son.

MACHRAY.—On June 14, in London, the wife of Dr. Robert Machray—a son.

SMITH.—On June 12, the wife of Dr. J. A. Smith, of Barnsley Hall, Bromsgrove—a son.

MARRIAGES

CURWEN—SCHWARTZ.—On June 10, at Tel-Aviv, Palestine, Sydney Curwen, major RAMC, to Ruth Schwartz.

FICKLING—WALKER.—On June 17, at Huddersfield, Benjamin William Fickling, FRCS, LDS, to Shirley Dona Walker.

MARTIN—BARRY.—On June 17, in London, George James Masson Martin, LRCPI, of Ipswich, to Clara Frances Barry.

OAKLEY—DUDLEY-BROWN.—On June 19, at Stone, George Eric Oakley, paymaster lieutenant RNVR, to Margaret Dudley-Brown, MB.

SNAPE—BENNETT.—On June 10, at Warrington, Seton Caldwell Snape, MRCS, to Doreen Bennett.

THOMAS—CARDWELL.—On June 5, Hendon Rex Thomas to Euphemia Cardwell, MRCS.

DEATHS

BANKART.—On June 19, at Star Cross, South Devon, Sir Reginald Bankart, KCVO, MB EDIN., DPH, surgeon rear-admiral (retd.), aged 75.

DYCE SHARP.—In October, 1942, at sea, by enemy action, Neville Alexander Dyce Sharp, MRCP, Whiteleaf, Aylesbury.

HIBBERT.—On June 15, at Bovey Tracey, Joseph Coote Hibbert, MD LOND., DPH.

MACGRATH.—On June 6, at Shoreham-by-Sea, Edmund John MacGrath, MRCS, aged 75, late of Kilbarron, co. Clare, Ireland.

MCLARTY.—On June 12, in Edinburgh, Malcolm McLarty, MB EDIN., FRCPE.

TOVEY.—On June 11, at Tauranga, New Zealand, Arthur Hamilton Tovey, MRCS, aged 67.

WHALE.—On June 17, in London, George Harold Lawson Whale, MD CAMB., FRCS.

WHITE.—On June 15, Harold Edward White, MB LOND., of Burstone Manor, Bow, Crediton, Devon, aged 68.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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